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TECHNICAL MEMORANDUM NO. 9
CHEMICALS OF CONCERN

HUMAN HEALTH RISK ASSESSMENT
903 PAD, MOUND, AND EAST TRENCHES AREAS
OPERABLE UNIT NO. 2

DRAFT

ROCKY FLATS ENVIRONMENTAL TECHNOLOGY SITE

U.S. DEPARTMENT OF ENERGY

Rocky Flats Environmental Technology Site
Golden, Colorado

ENVIRONMENTAL MANAGEMENT DEPARTMENT

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TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

1.0
INTRODUCTION

This Chemicals of Concern Technical Memorandum is part of the Baseline Risk Assessment (BRA) for the 903 Pad, Mound, and East Trenches Area, Operable Unit 2 (OU-2), at Rocky Flats Environmental Technology Site in Golden, Colorado. The BRA, which consists of the Human Health Risk Assessment (HHRA) and the Environmental Evaluation, will be included in the Phase II RCRA Facility Investigation/Remedial Investigation (RFI/RI) report for OU-2. The OU-2 RFI/RI is being conducted pursuant to the U.S. Department of Energy (DOE) Environmental Restoration Program, a Compliance Agreement between DOE, the U.S. Environmental Protection Agency (EPA), and the State of Colorado Department of Health (CDH); and the Federal Facility Agreement and Consent Order (Interagency Agreement), signed in 1991. The HHRA will evaluate potential human health risks for on-site and off-site receptors under current land use and probable future land use conditions, assuming no remedial action takes place in OU-2.

This technical memorandum presents the selection of chemicals of concern to be evaluated quantitatively or qualitatively in the HHRA. Chemicals of concern are organic chemicals, nitrates, metals, or radionuclides that exceed background range, that are environmental contaminants, and that could be a significant threat to human health under the exposure conditions evaluated. The identification of chemicals of concern will also help focus the efforts of environmental transport modeling, description of the nature and extent of contamination, and remedy selection.

OU-2 consists of 20 Individual Hazardous Substance Sites (IHSSs), plus two trenches whose locations are shown in Figure 1-1. Soil and groundwater samples were collected within IHSSs as well as surrounding areas. Chemicals of concern are identified on an OU-wide basis for each medium that was sampled in the OU-2 RFI/RI field program (i.e., surface soil, subsurface soil, and groundwater). Chemicals of concern in surface and subsurface soil are selected based on samples collected during Phase I and Phase II RFI/RIs at OU-2. Chemicals of concern for groundwater are selected based on samples collected from wells within OU-2 that are part of the site-wide groundwater monitoring program.

This technical memorandum is divided into the following sections. Section 2.0 describes the data used and the general process to select chemicals of concern for risk assessment. Sections 3.0 through 5.0 describe the identification of chemicals of concern for surface soil, subsurface soil, and groundwater. References are listed in Section 6.0

Appendix A, "Background Comparison for Metals and Radionuclides," summarizes the statistical methodology used to compare OU-2 data to background data and includes tables showing the results of the statistical tests. Statistical tests were used to identify metals and radionuclides whose concentrations exceed background levels and which may be environmental contaminants. These metals and radionuclides are retained for further evaluation as potential chemicals of concern.

Appendix B, "Risk-Based Evaluation of Infrequently Detected Chemicals," presents the screening of infrequently detected compounds (<5 percent detection frequency) to identify those that merit further evaluation, on the basis of high concentration and toxicity, as special-case chemicals of concern in small areas of localized contamination.

Appendix C, "Evaluation of Manganese and Antimony in UHSU Groundwater," summarizes the geochemical and temporal evidence supporting the conclusion that manganese and antimony are not contaminants in groundwater.

Appendix D, "Analytical Results for Unfiltered Aluminum, Antimony, Beryllium, Vanadium, TSS, and TDS in UHSU Groundwater," presents the data summary sheets for these analytes.

2.0
CHEMICALS OF CONCERN SELECTION PROCESS

2.1 OVERVIEW

The flow chart for selecting chemicals of concern for OU-2 is presented in Figure 2-1, Process for Identifying Chemicals of Concern. The process is intended to identify the chief environmental contaminants in each medium that could have adverse impacts on public health. In this way, the risk assessment is focussed on OU-2 contaminants that are potential significant health hazards. Inorganic compounds whose concentrations are within background range or that are essential nutrients or major cations are excluded from the risk assessment. Organic compounds that would contribute insignificantly to overall risk are identified but are not evaluated in the risk assessment.

Chemicals of concern were selected on an OU-wide basis for each medium. The individual steps shown in Figure 2-1 are listed below and described in the following sections.

2.2 Data Evaluation
2.3 Background Comparison for Inorganic Constituents
2.4 Essential Nutrient/Major Cation and Anion Screen
2.5 Frequency of Detection
2.6 Concentration/Toxicity Screens
2.7 Application of Professional Judgment
2.8 Risk-Based Evaluation of Infrequently Detected Compounds and Identification of "Special Case" Chemicals of Concern
2.9 Identification of Chemicals of Concern

2.2 DATA EVALUATION

2.2.1 Media-Specific Data Sets

Chemical analytical data from environmental samples collected during OU-2 field sampling programs and RFP site-wide sampling programs were evaluated to characterize contamination

in OU-2. Table 2-1, OU-2 Analytical Data Summary, describes which data were collected for each medium. Table 2-2 describes which analytes are included in each analytical group. The data sets used for evaluation of surface soil, subsurface soil and groundwater are described below. Data review and editing is discussed in Section 2.2.2.

Surface Soil

Data used to evaluate OU-2 contamination in surface soil were taken from two sources:

- OU-2 Phase II investigations conducted in 1991 and 1992. Some of the samples were collected by the CDH method (collects 0.25 inch deep sample) as described in Phase II RFI/RI Report for OU-2 (DOE 1993a) and some were collected by the modified RFP method (collects 2 inch deep sample) (DOE 1993a).

- OU-2 Phase II investigation in 1993 collected using the RFP sampling method (collects 2 inch deep sample).

The 1991 and 1992 surface soil samples were collected from 2.5- and 10-acre plots, as shown on Figure 3-1 and analyzed for radionuclides only. Plots were selected for sampling based on previous investigation results (DOE 1991). Samples collected using the CDH sampling method were analyzed for americium, plutonium, and uranium. Samples collected using the modified RFP sampling method were analyzed for americium and plutonium only. The CDH and modified RFP samples were collected within the same sampling plots to permit a comparison of the results of the two methods (comparison pending).

The 1993 surface soil samples were collected from 100-foot by 150-foot plots as shown on Figure 3-2. All 1993 samples were collected using the RFP sampling method. They were analyzed for semi-volatile organic compounds (SVOCs), pesticides/PCBs, metals, and radionuclides (except for americium, plutonium, and uranium).

Surface soil results from the three different sampling programs (CDH, modified-RFP, and RFP) were used to evaluate the nature and extent of contamination. As part of this evaluation, inorganic chemical data collected using the modified-RFP and RFP methods were

statistically compared to background data, which were also collected using the RFP method. For uranium, only CDH method data were available for OU-2, those data were compared to the RFP method background data.

Subsurface Soil

Data used to evaluate contamination in subsurface soil were taken from four sources:

- OU-2 Phase I field investigation conducted in 1987
- Boreholes drilled for seismic evaluation conducted in 1989
- OU-2 Phase II field investigation conducted in 1991 to 1993
- Well abandonment and replacement program conducted in 1992
- OU-2 Soil Vapor Extraction (SVE) Pilot Program conducted in 1993

Many of the boreholes drilled for OU-2 investigations were within IHSS boundaries established prior to the time of sampling. However, a number of IHSS boundaries changed with publication of the Historical Release Report (DOE 1992). Boreholes from other RFP programs used to evaluated OU-2 contamination may or may not be within IHSS boundaries. Borehole locations are shown on Figure 4-1.

For the background comparison and selection of chemicals of concern, results from subsurface soil samples collected below the high water table (based on May 1992 water levels which were higher than the average annual high) were not included in the data set in order to avoid including constituents transported by groundwater. Laboratory analyses of borehole samples was based on project-specific work plans, but generally included the following analyte groups: volatile organic compounds (VOCs), SVOCs, pesticides/PCBs, metals, radionuclides, and some analytes from the water quality parameter list.

Groundwater

Groundwater samples were collected from RFP monitoring wells on a quarterly basis under an RFP-wide groundwater sampling program. Samples were collected from over 80 wells installed during OU-2 Phase I and Phase II investigations and during other investigation

conducted in 1987 and 1989 that are within the OU-2 area. Monitoring well locations are shown on Figure 5-1.

Lithologic identifications for the groundwater monitoring data were determined, and only wells completed in the Upper Hydrostratigraphic Unit (UHSU) were included in the groundwater data set for the selection of chemicals of concern for risk assessment. The UHSU includes the Rocky Flats alluvium, colluvium, valley fill alluvium, the Arapahoe (No.1) Sandstone, weathered claystone of the Arapahoe and/or Laramie formations and subcropping Laramie Sandstones on the south facing slope of the Woman Creek drainage.

The data used for evaluation of contaminant concentrations in the UHSU were taken from samples collected from the second quarter of 1991 through the fourth quarter of 1992. The second quarter of 1991 was the first quarterly groundwater sampling event for which standard operating procedures and validation criteria were in place. Samples collected prior to the second quarter of 1991 were inconsistently collected and validated. In general, the groundwater samples were analyzed for VOCs, SVOCs, pesticides/PCBs, filtered and unfiltered metals, filtered and unfiltered radionuclides, and water-quality parameters.

2.2.2 Data Review and Editing

Chemical analytical data used in the selection of chemicals of concern included all useable data as available in January 1994. Examples of unusable data include samples with no result, no units, or incorrect units. As of January 1994, 74 percent of the data had been validated. Some of the data cannot be validated, as explained in Section 2.2.3.

Laboratory quality control samples including blanks, spikes, and surrogates, as well as tentatively identified compounds (TICS) were removed from the OU-2 data set. Field quality control samples, such as equipment rinsates, were also excluded from the working data set. Duplicate records for the samples were also removed as follows:

- If unvalidated and validated records for the same sample analysis were reported, the validated record was retained.

- If multiple validated results were reported for the same sample, the record that contained the most complete information or had the most recent validation date was retained.

- If results for both an initial analysis and a re-analysis or re-extraction were reported for the same sample, the lower detection limit was retained if both results were non-detects and the higher reported value was retained if both results were detects.

- Organic results that were E-qualified (exceeded calibration range) were replace with the associated D-qualified data (diluted to within calibration range).

Any results that were rejected (R-qualified) during the validation process were removed from the working data set. R-qualified data should be eliminated from risk assessment according to EPA criteria (EPA 1989). Rejected data represents 2 percent of the overall data. Radionuclides had the highest percentage of rejected data (9% or 1,208 records out of 13, 924 records) and VOCs had the total highest number of rejected records (2,133 records).

The final step in the data evaluation process was a review of the data qualifiers in the database to determine proper data use.

- The E-qualifier for metals results indicates that the reported value was estimated due to interference. These data were used as reported. (As discussed above, E-qualified organic results were replaced with the corresponding D-qualified result.)

- The B-qualifier for metals results signifies that the reported concentration is greater than the instrument detection limit but less than the Contract Required Quantitation Limit (CRQL) for that analyte. These data were used as reported. The B-qualifier for organic data is addressed separately in Section 2.2.3.

- Analytical results were J-qualified if the compound was positively identified below the quantitation limit. The result was considered an estimate because

of the uncertainty associated with detected concentrations at low levels. Data qualified with a J were used as reported.

- A U-qualifier assigned to an analytical result indicates that the analyzed chemical was not detected above the sample quantitation limit. The U-qualifier was the primary mechanism used for calculating detection frequency of organic and inorganic analytes. One-half the reporting limit was used as the surrogate concentration for U-qualified results in the student t-test and $UTL_{99/99}$ calculations.

For radionuclides, negative results were used as reported: therefore, there were no radionuclide non-detects.

2.2.3 Use of B-Qualified Results for Organics

Some of the analytical results for volatile and semivolatile organic compounds were not validated by the validation contractor because of either the absence of an approved validation procedure (e.g., for Method 502.2 volatiles) or data were too recent to have been through the validation procedure. The nonvalidated results comprise less than 26% of the OU-2 chemical analytical database. Non-validated results were retained in the database.

Volatile and semivolatile organic results that were qualified with a "B" by the laboratory (indicating that the compound was detected in the associated method blank) but that were not validated by the validation contractor, were evaluated using the following methodology and criteria:

1. Non-validated B-qualified results for common laboratory contaminants (methylene chloride, acetone, 2-butanone, and the common phthalates) were evaluated by comparing the reported concentration to ten times (10x) the Contract Required Quantitation Limit (CRQL), Practical Quantitation Limit (PQL), or Method Detection Limit (MDL) (depending on the analytical method). (See Table 2-3 for a summary of CRQL, PQL, and MDL values.) If the reported concentration exceeded the 10x value, then the contaminant was deemed present in the sample and the concentration was used as reported. If

the reported concentration was less than or equal to the 10x value, then the reported concentration was deemed attributable to laboratory contamination and the analyte was treated as non-detect.

2. Non-validated B-qualified results for analytes other than common laboratory contaminants were evaluated by comparing the reported concentration to five times (5x) the CRQL, PQL, or MDL (depending of the analytical method). If the reported concentration exceeded the 5x value, then the contaminant was deemed present in the sample and the concentration was used as reported. If the reported concentration was less than or equal to the 5x value, then the reported concentration was deemed attributable to laboratory contamination and the analyte was treated as non-detect.

Results that were B-qualified by the laboratory and validated by the validation contractor were used as reported (i.e., present in the sample at the reported concentration).

A summary of the evaluation of non-validated B-qualified results is shown on Table 2-4.

2.3 BACKGROUND COMPARISON FOR INORGANIC CONSTITUENTS

Analytical results for metals and radionuclides were compared to background levels derived from data for subsurface soil and groundwater reported in the Background Geochemical Characterization Report (DOE 1993b) and from background surface soil samples collected in the Rock Creek area during the 1991 OU-1 Phase III investigation and the 1993 OU-2 Phase II investigation. Metals and radionuclides whose concentrations did not exceed background levels were eliminated from further consideration as potential chemicals of concern.

Appendix A presents the background comparison methodology in detail and contains summary tables of statistical results for metals and radionuclides in all media. The methods and criteria used to evaluate whether a metal or radionuclide exceeded background levels are summarized here:

a. Analytical results for metals and radionuclides were compared to the background data using four statistical tests: the Quantile test, Slippage test, Student's t-test, and the Gehan test as described in the letter report of Gilbert (Gilbert 1993). Test conditions and treatment of nondetect values are discussed in Appendix A. The analyte was considered to be above background if it failed any test at the $p \leq 0.05$ level.

b. $UTL_{99/99}$ Comparison: Analytical results for each metal and radionuclide were compared to the 99 percent upper tolerance limit of background data calculated at the 99 percent confidence level ($UTL_{99/99}$). The $UTL_{99/99}$ test is an indicator of possible hot spots (Gilbert 1993), but with large sample sizes of one to two hundred, it is to be expected that one or two OU-2 data points would exceed the $UTL_{99/99}$ value. Nevertheless, if any result exceeded the $UTL_{99/99}$, the analyte was identified as a potential chemical of concern.

Some analytes did not fail any of the four statistical tests (that is, no significant statistical difference from background was found), but they were identified as potential chemicals of concern solely on the basis of one or more results exceeding the background $UTL_{99/99}$. In this case, if three or more results exceeded the $UTL_{99/99}$, the analyte was retained for evaluation in the concentration/toxicity screens for identification of OU-wide chemicals of concern (see Section 2.6). If only one or two results exceeded the $UTL_{99/99}$, but no statistical difference from background was found, the analyte was retained for "hot spot" evaluation in the risk-based screen described in Section 2.8.

2.4 ESSENTIAL NUTRIENT/MAJOR CATION AND ANION SCREEN

Calcium, iron, magnesium, potassium, and sodium were eliminated from further consideration as chemicals of concern because they are essential nutrients, they occur naturally in the environment, and they are toxic only at very high doses. Cations and anions in groundwater other than nitrates were also not evaluated further.

2.5 FREQUENCY OF DETECTION

All detected organic compounds and metals above background levels were evaluated for frequency of detection. Compounds that were detected at a frequency of 5 percent or greater were considered potential OU-wide chemicals of concern. These compounds were included in concentration/toxicity screens to identify compounds that could contribute significantly to total risk (see Section 2.6). Compounds detected at less than 5 percent frequency can be eliminated from further consideration because the compound is not characteristic of site contamination and the potential for exposure is low. Nevertheless, maximum concentrations of infrequently detected organic compounds and metals were compared to risk-based concentrations as described in Section 2.8 to identify isolated or highly localized occurrences of high concentrations of toxic chemicals (i.e., hot spots) that could pose a risk if routine exposure were to occur. These chemicals were retained as "special case" chemicals of concern for separate evaluation in the risk assessment. Since there were no non-detect results for radionuclides (negative values were used as reported), they were considered to be detected at 100 percent frequency.

2.6 CONCENTRATION/TOXICITY SCREEN

Chemicals of concern were selected for each medium using concentration/toxicity screens for noncarcinogens, carcinogens, and radionuclides. The screens included each organic chemical and inorganic constituents above background levels that were detected at 5 percent frequency or greater in the medium. The purpose of applying the screen is to focus the risk assessment on the chief contributors to potential risk. To perform the screen, each chemical in a medium (such as groundwater) is scored according to its maximum detected concentration and toxicity to obtain a risk factor. The risk factor for noncarcinogenic effects is the maximum detected concentration divided by the EPA Reference Dose (RfD) for that chemical. The risk factor for carcinogenic effects is the maximum detected concentration (or activity) multiplied by the EPA cancer slope factor (SF) for that chemical. The chemical-specific risk factors are summed to calculate total risk factors for the noncarcinogenic, carcinogenic, and radioactive chemicals of potential concern in each medium. The ratio of the risk factor for each chemical to the total risk factor is called a risk index and approximates the relative risk associated with each chemical in the medium. Separate concentration/toxicity screens are performed for

carcinogenic and noncarcinogenic effects of organic compounds and metals and for carcinogenic effects of radionuclides.

Each chemical that comprised 1 percent or more of the total risk factor was considered a chemical of concern to be retained for evaluation in the quantitative risk assessment. This approach reduces the number of chemicals to be carried through the risk assessment. However, the approach is conservative (health protective) because it retains some chemicals that contribute as little as 1 percent of the total potential risk. In most cases, only a few chemicals contribute the majority of potential risk in each medium.

EPA-recommended toxicity factors (RfDs and cancer SFs) were used in the concentration/toxicity screens. SFs and RfDs were determined from IRIS (EPA 1994), HEAST (EPA 1993), and other EPA sources if available. The toxicity factors used in the screens are listed in Tables 2-5 and 2-6.

EPA-established toxicity factors are not available for some of the potential chemicals of concern. Therefore, these analytes cannot be included in the concentration/toxicity screens, in other toxicity-based screens, or in the quantitative risk assessment. OU-2 contaminants without toxicity factors were identified for each medium and are listed in each section. The potential impact of these compounds on overall risk will be addressed qualitatively in the human health risk assessment.

2.7 APPLICATION OF PROFESSIONAL JUDGMENT

Professional judgment was used at two points in the process of selecting chemicals of concern for human health risk assessment:

1. Exclusion of some potential chemicals of concern based on log-normal $UTL_{99/99}$ comparison: The background $UTLs_{99/99}$ presented in the Background Geochemical Characterization Report (DOE 1993b) were calculated assuming that the background data were normally distributed. This assumption may not be appropriate for all analytes. Concentrations of some analytes were within background range according to all statistical tests performed, but one or two results exceeded the background $UTL_{99/99}$. This resulted in identifying the

analyte as a potential chemical of concern. When the distribution of the background data was tested, if the better fit was to a log-normal distribution, the UTL $_{99/99}$ was recalculated based on log-normal distribution and the site results were compared to the log-normal based $UTL_{99/99}$. This resulted in excluding some analytes as potential chemicals of concern. Chemicals so removed are noted on tables in Appendix A.

2. Exclusion of some potential chemicals of concern based on spatial/temporal and geochemical evaluation: The spatial and temporal distribution and geochemical characteristics of certain metals identified as being above background levels were evaluated to support a conclusion as to whether they were likely to be naturally occurring or due to environmental contamination. For example, manganese in groundwater was concluded to be naturally occurring based on spatial, temporal, and geochemical evaluation. This judgment process resulted in removing several metals as potential chemicals of concern. All such professional judgment is described in each section, where relevant.

2.8 RISK-BASED EVALUATION OF INFREQUENTLY DETECTED COMPOUNDS

Chemicals detected infrequently (in less than 5 percent of all samples in the medium) can usually be eliminated from consideration as chemicals of concern because they are not characteristic of site contamination and the potential for exposure is low. However, these compounds were further screened so as not to neglect an infrequently detected compound that could contribute significantly to risk if routine exposure to a hot spot were to occur. In this analysis, maximum measured concentrations were compared to screening levels equivalent to one thousand times (1000x) risk-based preliminary remediation goals (PRGs) (DOE 1994). This analysis is summarized below and is presented in detail in Appendix B.

For screening purposes, PRGs were defined as chemical concentrations associated with an excess cancer risk of 10^{-6} (1 in 1 million) or a hazard index for noncarcinogenic effects of 1, assuming residential exposures. Any infrequently detected chemical measured at a concentration greater than 1000x the respective PRG was identified as representing a

potentially significant health threat if routine exposure were to occur and was included in the list of "special case" chemicals of concern for evaluation in the risk assessment. PRGs were calculated (DOE 1994) assuming a residential exposure scenario and using standard toxicity values (RfDs and SFs) published by EPA. PRGs for chemicals in soils were calculated assuming multiple pathway exposure (ingestion and inhalation of particulates). PRGs for chemicals in groundwater were calculated based on ingestion and inhalation of volatile organic compounds. The exposure parameters used to calculate PRGs are presented in Appendix B.

2.9 IDENTIFICATION OF CHEMICALS OF CONCERN

OU-wide chemicals of concern were identified on the basis of the background comparison and application of the concentration/toxicity screens. Special-case (hot spot) chemicals of concern were identified using the risk-based PRG screen for infrequently detected compounds. OU-wide and special-case chemicals of concern for each medium are summarized in each section of this memorandum.

TABLE 2-1
ROCKY FLATS PLANT OU-2
ANALYTICAL DATA SUMMARY

Data Description: Borehole		Collected By	Data Used for Chemicals of Concern
Metals 1987		Weston	All subsurface soil data from above high water table.
Metals 1991-1992		W-C	All subsurface soil data from above high water table.
Pesticides/PCBs 1987		Weston	All subsurface soil data from above high water table.
Pesticides/PCBs 1991-1992		W-C	All subsurface soil data from above high water table.
Radionuclides 1987		Weston	All subsurface soil data from above high water table.
Radionuclides 1991-1992		W-C	All subsurface soil data from above high water table.
SVOCs 1987		Weston	All subsurface soil data from above high water table.
SVOCs 1991-1992		W-C	All subsurface soil data from above high water table.
VOCs 1987		Weston	All subsurface soil data from above high water table.
VOCs 1991-1992		W-C	All subsurface soil data from above high water table.
Data Description: Groundwater		**Collected By**	**Data Used for Chemicals of Concern**
Pesticides/PCBs	1st and 2nd Quarters 1992	Site-Wide Program (IT)	1st and 2nd Quarter 1992
Pesticides/PCBs	All Quarters 1991	Site-Wide Program (IT)	2nd through 4th Quarter 1991
Dissolved Radionuclides	1st and 2nd Quarters 1992	Site-Wide Program (IT)	1st and 2nd Quarter 1992
Total Radionuclides	1st and 2nd Quarters 1992	Site-Wide Program (IT)	1st and 2nd Quarter 1992
Dissolved Radionuclides	3rd and 4th Quarters 1992	Site-Wide Program (IT)	3rd Quarter 1992
Total Radionuclides	3rd and 4th Quarters 1992	Site-Wide Program (IT)	3rd Quarter 1992
Dissolved Radionuclides	All Quarters 1990	Site-Wide Program (IT)	Not Used
Total Radionuclides	All Quarters 1990	Site-Wide Program (IT)	Not Used
Dissolved Radionuclides	All Quarters 1991	Site-Wide Program (IT)	2nd through 4th Quarter 1991
Total Radionuclides	All Quarters 1991	Site-Wide Program (IT)	2nd through 4th Quarter 1991
SVOCs	1st and 2nd Quarters 1992	Site-Wide Program (IT)	1st and 2nd Quarter 1992
SVOCs	4th Quarter 1991	Site-Wide Program (IT)	4th Quarter 1991
VOCs	1st and 2nd Quarters 1992	Site-Wide Program (IT)	1st and 2nd Quarter 1992
VOCs	3rd and 4th Quarters 1992	Site-Wide Program (IT)	3rd Quarter 1992
VOCs	All Quarters 1990	Site-Wide Program (IT)	Not Used
VOCs	All Quarters 1991	Site-Wide Program (IT)	2nd through 4th Quarter 1991
Water Quality Parameters	1st and 2nd Quarters 1992	Site-Wide Program (IT)	Not Used
Water Quality Parameters	3rd and 4th Quarters 1992	Site-Wide Program (IT)	Not Used
Water Quality Parameters	All Quarters 1990	Site-Wide Program (IT)	Not Used
Water Quality Parameters	All Quarters 1991	Site-Wide Program (IT)	Not Used
Metals	1st Quarter 1990- 4th Quarter 1992	Site-Wide Program (IT)	2nd Qtr 1991 - 3rd Qtr 1992
Data Description: Surficial Soil		**Collected By**	**Data Used for Chemicals of Concern**
1993 data not including background (met, rads, sv, pest)		W-C	All
1991 data (rads)		Stoller/W-C	All

TABLE 2-2
OU-2 PHASE II RFI/RI ANALYTICAL PARAMETERS

TARGET ANALYTE LIST (TAL) - METALS
- Aluminum
- Antimony
- Arsenic
- Barium
- Beryllium
- Cadmium
- Calcium
- Chromium
- Cobalt
- Copper
- Cyanide
- Iron, Total, Dissolved
- Lead
- Magnesium
- Manganese, Total Dissolved
- Mercury
- Nickel
- Potassium
- Selenium
- Silver
- Sodium
- Thallium
- Vanadium
- Zinc

ADDITIONAL - METALS
- Cesium
- Lithium
- Molybdenum
- Silicon
- Strontium
- Tin

GRAPHITE FURNACE ATOMIC ABSORPTION (GFAA) - METALS
- Cadmium
- Copper
- Iron, Total
- Lead
- Manganese
- Silver
- Zinc

TARGET COMPOUND LIST (TCL) - VOCs
- Chloromethane
- Bromomethane
- Vinyl chloride
- Chloroethane
- Methylene chloride
- Acetone
- Carbon disulfide
- 1,1-Dichloroethene
- 1,1-Dichloroethane
- total 1,2-Dichloroethene
- Chloroform
- 1,2-Dichloroethane
- 2-Butanone
- 1,1,1-Trichloroethane
- Carbon tetrachloride
- Vinyl acetate
- Bromodichloromethane
- 1,1,2,2-Tetrachloroethane
- 1,2-Dichloropropane
- cis-1,3-Dichloropropene
- Trichloroethene
- Dibromochloromethane
- 1,1,2-Trichloroethane
- Benzene
- trans-1,3-Dichloropropene
- Bromoform
- 2-Hexanone
- 4-Methyl-2-pentanone
- Tetrachloroethene
- Toluene
- Chlorobenzene
- Ethyl benzene
- Styrene
- Total xylenes

TCL - SVOCs
- Phenol
- bis(2-Chloroethyl)ether
- 2-Chlorophenol
- 1,3-Dichlorobenzene
- 1,4-Dichlorobenzene
- Benzyl alcohol

TABLE 2-2
(continued)

1,2-Dichlorobenzene
2-Methylphenol
bis(2-Chloroisopropyl)ether
4-Methylphenol
N-Nitroso-di-n-dipropylamine
Hexachloroethane
Nitrobenzene
Isophorone
2-Nitrophenol
2,4-Dimethylphenol
Benzoic acid
bis(2-Chloroethoxy)methane
2,4-Dichlorophenol
1,2,4-Trichlorobenzene
Naphthalene
4-Chloroaniline
Hexachlorobutadiene
4-Chloro-3-methylphenol
(para-chloro-meta-cresol)
2-Methylnaphthalene
Hexachlorocyclopentadiene
2,4,6-Trichlorophenol
2,4,5-Trichlorophenol
2-Chloronaphthalene
2-Nitroaniline
Dimethylphthalate
Acenaphthylene
2,6-Dinitrotoluene
3-Nitroaniline
Acenaphthene
2,4-Dinitrophenol
4-Nitrophenol
Dibenzofuran
2,4-Dinitrotoluene
Diethylphthalate
4-Chlorophenyl phenyl ether
Fluorene
4-Nitroaniline
4,6-Dinitro-2-methylphenol
N-Nitrosodiphenylamine
4-Bromophenyl phenyl ether
Hexachlorobenzene
Pentachlorophenol
Phenanthrene
Anthracene
Di-n-butylphthalate
Fluoranthene
Pyrene
Butylbenzylphthalate
3,3'-Dichlorobenzidine
Benzo(a)anthracene
Chrysene
bis(2-Ethylhexyl)phthalate
Di-n-octylphthalate
Benzo(b)fluoranthene
Benzo(k)fluoranthene
Benzo(a)pyrene
Indeno(1,2,3-cd)pyrene
Dibenz(a,h)anthracene
Benzo(g,h,i)perylene

TCL - PESTICIDES/PCBs
alpha-BHC
beta-BHC
delta-BHC
gamma-BHC (Lindane)
Heptachlor
Aldrin
Heptachlor epoxide
Endosulfan I
Dieldrin
4,4'-DDE
Endrin
Endosulfan II
4,4'-DDD
Endosulfan sulfate
4,4'-DDT
Methoxychlor
Endrin ketone
alpha-Chlordane
gamma-Chlordane
Toxaphene
Aroclor-1016
Aroclor-1221
Aroclor-1232
Aroclor-1242
Aroclor-1248
Aroclor-1254
Aroclor-1260

TABLE 2-2
(continued)

RADIONUCLIDES
- Gross Alpha
- Gross Beta
- Uranium 233+234, 235, and 238 (each species)
- Americium 241
- Plutonium 239/240
- Tritium
- Cesium 137 Total
- Strontium 89 + 90 Total

TOTAL ORGANIC CARBON (TOC)
NITRATE/NITRITE AS N

Parameters Exclusively for Groundwater Samples

FIELD PARAMETERS
- pH
- Specific Conductance
- Temperature
- Dissolved Oxygen
- Barometric Pressure

WATER QUALITY PARAMETER LIST (WQPL)
- Chloride
- Fluoride
- Sulfate
- Carbonate
- Bicarbonate
- Total Dissolved Solids
- Total Suspended Solids

TABLE 2-3
ROCKY FLATS PLANT OU-2
QUANTITATION AND METHOD DETECTION LIMITS FOR B-QUALIFIED ORGANIC COMPOUNDS

Analyte	CRQL	PQL	MDL	Method
1,1-Dichloroethene			0.04 µg/L	VOA502.2
1,2,3-Trichloroebenzene			0.05 µg/L	VOA502.2
1,2,4-Trichlorobenzene			0.20 µg/L	VOA524.2
4-Methyl-2-pentanone	10 µg/kg			VOACLP
Acetone		100 µg/kg		VOA8240
Acetone	10 µg/kg			VOACLP
Acetone	10 µg/kg			VOCCLPTCL
Acetone	10 µg/L			VOCCLPTCL
Bis(2-ethylhexyl)phthalate	330 µg/kg			BNACLP
Carbon disulfide	5 µg/kg			VOACLP
Carbon tetrachloride			0.01 µg/L	VOA502.2
Chloroform	5 µg/kg			VOCCLPTCL
Di-n-butyl phthalate	330 µg/kg			BNACLP
Hexachlorobutadiene			0.02 µg/L	VOA502.2
Methylene chloride	5 µg/kg			RFVO
Methylene chloride			0.01 µg/L	VOA502.2
Methylene chloride			0.09 µg/L	VOA524.2
Methylene chloride		5 µg/kg		VOA8240
Methylene chloride	5 µg/kg			VOACLP
Methylene chloride	5 µg/L			VOCCLPTCL
N-Nitrosodiphenylamine	330 µg/kg			BNACLP
Naphthalene			0.02 µg/L	VOA502.2
sec-Butylbenzene			0.03 µg/L	VOA502.2
Styrene		5 µg/kg		VOA8240
Tetrachloroethene			0.02 µg/L	VOA502.2
Toluene			0.02 µg/L	VOA502.2
Toluene	5 µg/kg			VOACLP
Total Xylenes		5 µg/kg		VOA8240
Trichloroethene			0.03 µg/L	VOA502.2
Trichloroethene			0.02 µg/L	VOA524.2

CRQL, PQL, and MDL values are from General Radiochemistry and Routine Analytical Sevices Protocol (GRRASP) (EG&G 1991)

TABLE 2-4
ROCKY FLATS PLANT OU-2
EVALUATION SUMMARY OF NON-VALIDATED B-QUALIFIED RESULTS

Analyte	Medium [1]	No. Non -Validated B-Qualified Results [2]	Evaluation Using or Rule [3]	
			No. Detects	No. Non - Detects
1,1-Dichloroethene	GW	5	5	0
1,2,3-Trichlorobenzene	GW	1	1	0
4-Methyl-2-Pentanone	BH	1	0	1
Acetone	BH	193	84	109
	GW	2	0	2
Bis(2-ethylhexyl)phthalate	BH	92	4	88
Carbon Disulfide	BH	1	1	0
Chloroform	GW	3	0	3
Di-n-Butyl Phthalate	BH	1	0	1
Hexachlorobutadiene	GW	1	1	0
Methylene Chloride	BH	139	8	131
	GW	15	12	3
N-Nitrosodiphenylamine	BH	1	0	1
Naphthalene	GW	2	2	0
sec-Butylbenzene	GW	5	5	0
Styrene	BH	1	0	1
Tetrachloroethene	GW	3	3	0
Toluene	BH	1	0	1
	GW	1	1	0
Xylene, total	BH	1	0	1
Trichloroethene	GW	3	3	0

[1] GW = groundwater; BH = borehole (subsurface soil)

[2] B-qualified by laboratory

[3] Using the CRQL, PQL, or MDL as basis for evaluation

TABLE 2-5
ROCKY FLATS OU-2
TOXICITY FACTORS FOR
ORGANIC COMPOUNDS AND METALS

Analyte	Slope Factors		EPA Cancer Weight of Evidence	Reference Doses		
	Oral	Inhalation		Oral	Inhalation (*)	RfC
1,1,1,2-Tetrachloroethane	2.6E-02 (1)	2.6E-02 (1)	C	3.0E-02 (1)	-	-
1,1,2,2-Tetrachloroethane	2.0E-01 (1)	2.0E-01 (1)	C	-	-	-
1,1,2-Trichloroethane	5.7E-02 (1)	5.7E-02 (1)	C	4.0E-03 (1)	-	-
1,1-Dichloroethane	-	-	C	1.0E-01 (2)	1.4E-01 (3)	5.0E-01 (3)
1,1-Dichloroethene	6.0E-01 (1)	1.7E-01 (1)	C	9.0E-03 (1)	-	-
1,2,3-Trichloropropane	-	-	-	6.0E-03 (1)	-	-
1,2,4-Trichlorobenzene	-	-	-	1.0E-02 (1)	3.0E-03 (3)	9.0E-03 (3)
1,2-Dibromo-3-chloropropane	1.4E+00 (2)	6.9E-07 (2)	B2	-	5.0E-05 (1)	2.0E-04 (1)
1,2-Dibromoethane	8.5E+01 (1)	7.7E-01 (1)	B2	-	-	-
1,2-Dichloroethane	9.1E-02 (1)	9.1E-02 (1)	B2	-	-	-
1,2-Dichloroethene	-	-	-	9.0E-03 (2)	-	-
cis-1,2-Dichloroethene	-	-	-	1.0E-02 (2)	-	-
trans-1,2-Dichloroethene	-	-	-	2.0E-02 (1)	-	-
1,2-Dichloropropane	-	-	-	-	1.0E-03 (1)	4.0E-03 (1)
1,3-Dichloropropane	-	-	-	3.0E-04 (1)	-	2.0E-02 (1)
cis-1,3-Dichloropropene**	1.8E-01 (2)	1.3E-01 (2)	B2	3.0E-04 (1)	5.0E-03 (1)	2.0E-02 (1)
trans-1,3-Dichloropropene **	1.8E-01 (2)	1.3E-01 (2)	B2	3.0E-04 (1)	5.0E-03 (1)	2.0E-02 (1)
1,4-Dichlorobenzene	2.4E-02 (2)	-	C	-	2.3E-01 (1)	8.0E-01 (2)
2-Butanone	-	-	D	6.0E-01 (1)	3.00E-01	1.0E+00 (1)
2-Methylphenol	-	-	-	5.0E-02 (1)	-	-
4,4'-DDT	3.4E-01 (1)	3.4E-01 (1)	B2	5.0E-04 (1)	-	-
4-Methyl-2-pentanone	-	-	-	5.0E-02 (2)	2.3E-02 (3)	8.0E-02 (3)
4-Methylphenol	-	-	-	5.0E-03 (6)	-	-
Acenaphthene	-	-	-	6.0E-02 (1)	-	-
Acetone	-	-	-	1.0E-01 (1)	-	-
Aluminum	-	-	-	2.9E+00 (6)	-	-
Anthracene	-	-	-	3.0E-01 (1)	-	-
Antimony	-	-	-	4.0E-04 (1)	-	-
Arsenic	1.7E+00 ***	1.5E+01 ***	A	3.0E-04 (1)	-	-
Barium	-	-	-	7.0E-02 (1)	1.4E-04 (3)	5.0E-04 (3)
Benzene	2.9E-02 (1)	2.9E-02 (1)	A	-	-	-
Benzo(a)anthracene	7.3E-01 (4)	-	B2	-	-	-
Benzo(a)pyrene	7.3E+00 (4)	-	B2	-	-	-
Benzo(b)fluoranthene	7.3E-01 (4)	-	B2	-	-	-
Benzo(k)fluoranthene	7.3E-02 (4)	-	B2	-	-	-
Benzoic acid	-	-	-	4.0E+00 (1)	-	-
Beryllium	4.3E+00 (1)	8.4E+00 (1)	B2	5.0E-03 (1)	-	-
Bis(2-ethylhexyl)phthalate	1.4E-02 (1)	-	B2	2.0E-02 (1)	-	-
Bromobenzene	-	-	-	5.0E-03 (1)	-	-
Bromodichloromethane	6.2E-02 (1)	-	B2	2.0E-02 (1)	-	-
Bromoform	7.9E-03 (1)	3.9E-03 (2)	B2	2.0E-02 (1)	-	-

TABLE 2-5
(Continued)

Analyte	Slope Factors		EPA Cancer Weight of Evidence	Reference Doses		
	Oral	Inhalation		Oral	Inhalation (*)	RfC
Bromomethane	-	-	-	1.4E-03 (1)	1.4E-03	5.0E-03 (1)
Butylbenzene (sec, tert)	-	-	-	1.0E-02 (6)	-	-
Butyl benzylphthalate	-	-	C	2.0E-01 (1)	-	-
Cadmium (food)	-	6.3E+00 (1)	B1	1.0E-03 (1)	-	-
Cadmium (water)	-	-	B1	5.0E-04 (1)	-	-
Carbon disulfide	-	-	-	1.00E-01 (1)	2.9E-03	1.0E-02 (2)
Carbon tetrachloride	1.3E-01(1)	5.2E-02 (1)	B2	7.0E-04 (1)	-	-
Cesium	-	-	-	-	1.4E-03	5.0E-03 (1)
Chlorobenzene	-	-	-	2.0E-02 (1)	5.7E-03	2.0E-02 (3)
Chloroethane	-	-	-	-	3.0E+00	1.0E+01 (1)
Chloroform	6.1E-03 (1)	8.0E-02 (1)	B2	1.0E-02 (1)	-	-
Chlorotoluene,o-	-	-	-	2.0E-02 (1)	-	-
Chromium III	-	-	-	1.0E+00 (1)	-	-
Chrysene	7.3E-02 (4)	-	B2	-	-	-
Cobalt	-	-	-	1.8E-01 (6)	-	-
Di-n-butylphthalate	-	-	D	1.0E-01 (1)	-	-
Di-n-octylphthalate	-	-	D	2.0E-02 (2)	-	-
Dibromochloromethane	8.4E-02 (1)	-	-	2.0E-02 (1)	-	-
Dibromomethane	-	-	-	-	5.7E-05	2.0E-04 (2)
Dichlorodifluoromethane	-	-	-	2.0E-01 (1)	5.7E-02	2.0E-01 (3)
Diethyl phthalate	-	-	-	8.0E-01 (1)	-	-
Ethylbenzene	-	-	D	1.0E-01 (1)	3.0E-01	1.0E+01 (1)
Fluoranthene	-	-	-	4.0E-02 (1)	-	-
Fluorene	-	-	-	4.0E-02 (1)	-	-
Heptachlor epoxide	9.1E+00 (1)	9.1E+00 (1)	B2	1.3E-05 (1)	-	-
Hexachlorobutadiene	7.8E-02 (1)	7.7E-02 (1)	C	-	-	-
Hexachloroethane	1.4E-02 (1)	1.4E-02 (1)	C	1.0E-03 (1)	-	-
Indeno(1,2,3-cd)pyrene	7.3E-01 (4)	-	B2	-	-	-
Lithium	-	-	-	2.0E-02 (6)	-	-
Manganese (food)	-	-	D	1.4E-01 (1)	1.4E-05	5.0E-05 (1)
Manganese (water)	-	-	D	5.0E-03 (1)	-	-
Mercury	-	-	D	3.0E-04 (2)	9.0E-05	3.0E-04 (2)
Methylene chloride	7.5E-03 (1)	1.6E-03 (1)	B2	6.0E-02 (1)	9.0E-01	3.0E+00 (2)
Molybdenum	-	-	-	5.0E-03 (1)	-	-
N-nitrosodiphenylamine	4.9E-03 (1)	-	B2	-	-	-
Naphthalene	-	-	-	4.0E-02 (6)	-	-
Nickel	-	8.4E-01 (1)	A	2.0E-02 (1)	-	-
Nitrate	-	-	-	1.6E-00 (1)	-	-
Pentachlorophenol	1.2E-01(1)	-	B2	3.0E-02 (1)	-	-
Polychlorinated biphenyls	7.7E+00 (1)	-	B2	-	-	-
Pyrene	-	-	D	3.0E-02 (1)	-	-
Selenium	-	-	-	5.0E-03 (1)	-	-
Silver	-	-	D	5.0E-03 (1)	-	-

TABLE 2-5
(Concluded)

Analyte	Slope Factors		EPA Cancer Weight of Evidence	Reference Doses		RfC
	Oral	Inhalation		Oral	Inhalation (*)	
Strontium	-	-	-	6.0E-01 (1)	-	-
Styrene	-	-	-	2.0E-01 (1)	2.8E+00	1.0E+01 (1)
Tetrachloroethene	5.2E-02 (5)	2.0E-03 (5)	B2	1.0E-02 (1)	-	-
Thallium (oxide)	-	-	-	7.0E-05 (2)	-	-
Tin	-	-	-	6.0E-02 (2)	-	-
Toluene	-	-	D	2.0E-01 (1)	1.1E-01	4.0E-00 (1)
Trichloroethene	1.1E-02 (5)	6.0E-03 (5)	B2	-	-	-
Trichlorofluoromethane	-	-	-	3.0E-01 (1)	-	-
Xylenes	-	-	-	2.0E+00 (1)	-	-
Vanadium	-	-	-	7.0E-03 (2)	-	-
Vinyl chloride	1.9E+0 (1)	3.0E-01 (1)	A	-	-	-
Zinc	-	-	D	3.0E-01 (1)	-	-

Sources:

1 = IRIS (EPA 1994).

2 = HEAST 1993 and Supplements (EPA 1993a).

3 = HEAST 1993 Table 2 (EPA 1993a).

4 = EPA 1993b.

5 = Joan S. Dollarhide, Superfund Health Risk Technical Support Center. "Carcinogenicity Characterization of Perchloroethylene (PERC) and Trichloroethylene (TCE) (Luke Air Force Base. Arizona)." ECAO.

6 = Provisional values for aluminum, butylbenzene, cobalt, lithium, and naphthalene. USEPA. ECAO.

Notes:

* Calculated from RfC. RfD = RfC x 20m3/day/70kg.

** Values are for 1,3-dichloropropene. No data for individual isomer.

*** Converted from IRIS unit risks. Oral proposed U.R. = 5.00E-05/ug/L. Inhalation U.R. = 4.30E-03/ug/m3. Oral SF = 5.00E-05 x 1000ug/mg x 70kg/2L. Inhalation SF = 4.30E-03/ug/m3x1000ug/mgx70kg/20m3.

EPA Cancer Weight of Evidence :

A = Human carcinogen

B1 = Probable human carcinogen (limited human data)

B2 = Probable human carcinogen (animal data only)

C = Possible human carcinogen

D = Noncarcinogenic (inadequate evidence)

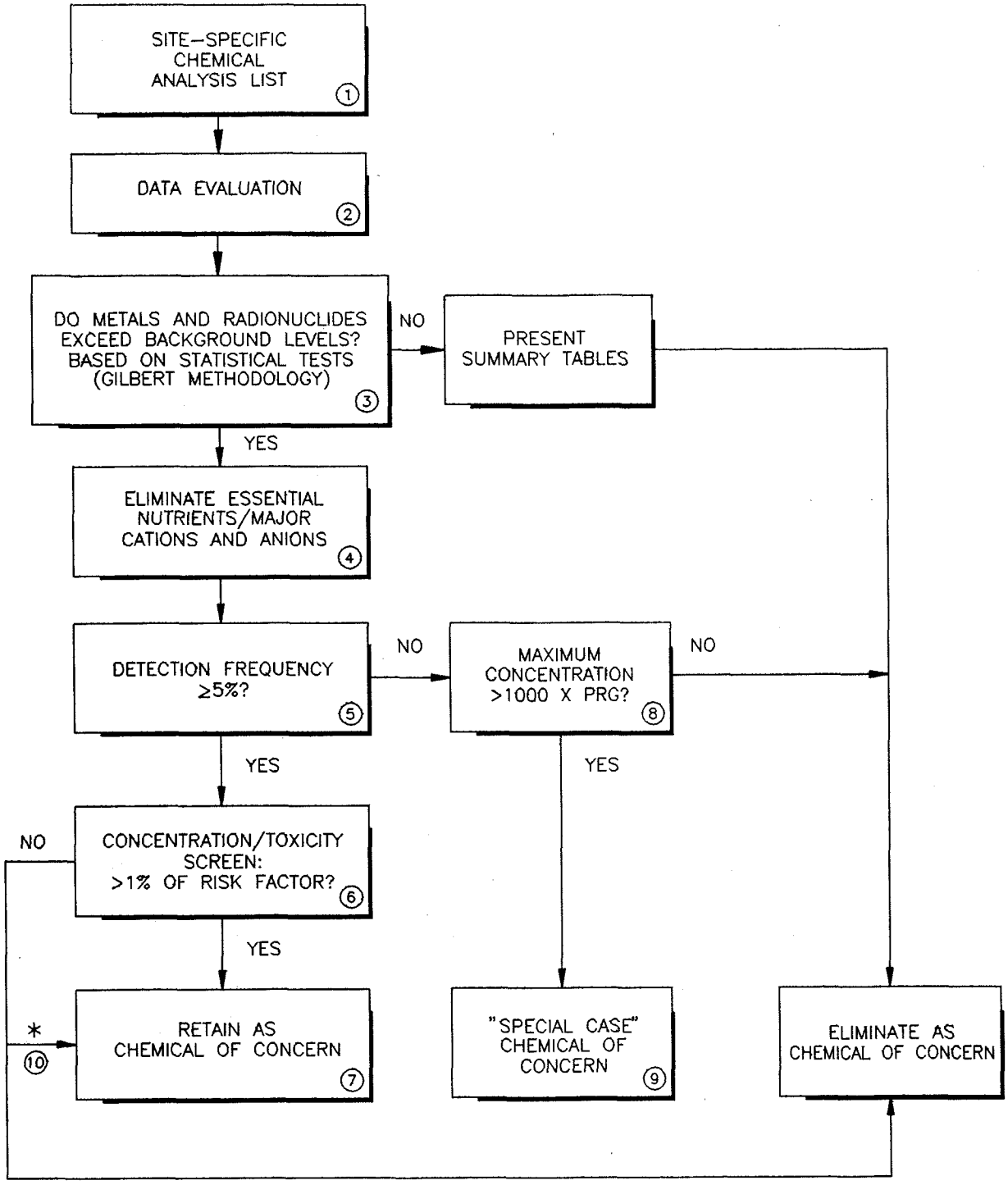
- = Not classifiable or not carcinogenic

TABLE 2-6
ROCKY FLATS PLANT OU-2
SLOPE FACTORS
FOR RADIONUCLIDES

Analyte	Oral (Risk/pCi)	Inhalation (Risk/pCi)	External (Risk/yr/pCi/g)	EPA Cancer Weight of Evidence
Americium-241	2.4E-10	3.2E-08	4.9E-09	A
Cesium-137 +D	2.8E-11	1.9E-11	2.0E-06	A
Plutonium-239	2.3E-10	3.8E-08	1.7E-11	A
Plutonium-240	2.3E-10	3.8E-08	2.7E-11	A
Radium-226 +D	1.2E-10	3.0E-09	6.0E-06	A
Radium-228 +D	1.0E-10	6.6E-10	2.9E-06	A
Strontium-89	3.0E-12	2.9E-12	4.7E-10	A
Strontium-90 +D	3.6E-11	6.2E-11	0.0E+00	A
Tritium	5.4E-14	7.8E-14	0.0E+00	A
Uranium-233,234 *	1.6E-11	2.6E-08	3.0E-11	A
Uranium-235 +D	1.6E-11	2.5E-08	2.4E-07	A
Uranium-238 +D	2.8E-11	5.2E-08	3.6E-08	A

Source: HEAST 1993.

A = Class A (human) carcinogen.
* = Slope factors shown are for U-234.
+D = Risks from radioactive decay products included.



* PROFESSIONAL JUDGEMENT
PRG PRELIMINARY REMEDIATION GOAL (DOE 1994)

U.S. DEPARTMENT OF ENERGY
Rocky Flats Plant, Golden, Colorado

OPERABLE UNIT NO. 2
TECHNICAL MEMORANDUM NO. 9

PROCESS FOR IDENTIFYING CHEMICALS OF CONCERN – OU2 HUMAN HEALTH RISK ASSESSMENT

FIGURE 2–1 JULY 1994

OU2TM902

3.0
SURFACE SOIL CHEMICALS OF CONCERN

3.1 SURFACE SOIL DATA SET

Chemicals of concern in surface soil were selected using data from samples collected in the OU-wide sampling program. Samples were collected within IHSSs as well as in a grid pattern across the whole OU. The data set includes 69 samples analyzed for metals (some metals were not analyzed for in some samples), between 13 and 80 samples analyzed for various radionuclides, and 40 samples analyzed for SVOCs and pesticide/PCBs. The sampling and analytical program is summarized in Tables 2-1 and 2-2. Sample sizes for each analyte are listed in the Background Comparison Summary Tables in Appendix A. Surface soil sampling locations are shown in Figures 3-1 and 3-2.

3.2 BACKGROUND COMPARISON AND FREQUENCY OF DETECTION

Tables 3-1 and 3-2 summarize the maximum detected concentrations, detection frequencies, and results of the background comparison for metals in OU-2 surface soil samples. The statistical comparisons to background data are presented in detail in Appendix A. Cesium, molybdenum, and silver were all detected at less than 5 percent frequency. Radionuclides are assumed to be detected at 100 percent frequency, and radionuclides above background levels are listed in the concentration/toxicity screen in Table 3-4.

Background surface soil data consist of analytical results from samples collected at 18 locations in the Rock Creek area. Nine of the locations were sampled in February 1992 and the remaining nine locations were sampled in March 1993. All background surface soil samples were collected using the RFP sampling method, a composite method in which the top 2 inches of soil are collected. The OU-2 samples were collected using the RFP and CDH methods as discussed in Section 2.2.

All radionuclides above background levels, as well as organics and metals above background that were detected at 5 percent or greater detection frequency, were included in concentration/toxicity screens to select OU-wide chemicals of concern. Chromium and lead

were the only two metals that were identified as being potential chemicals of concern based on the background comparison (other than calcium and iron, which were removed from further evaluation in Section 2.4). The maximum chromium concentration was 29.5 mg/kg; the maximum lead concentration was 145 mg/kg. Since lead does not have approved EPA toxicity factors, it cannot be included in the concentration/toxicity screen to select risk-based chemicals of concern. However, it will be retained for qualitative evaluation in the risk assessment.

Chromium was not included in the concentration/toxicity screen for the following reasons. Chromium was not significantly different than background according to the formal statistical test described in Appendix A. In addition, chromium had only two sample results that exceeded the background $UTL_{99/99}$ of 24.8 mg/kg. One result of 29.5 mg/kg occurred at location SS200893, which is in a non-IHSS area approximately 700 feet south of the Southeast Trenches, and one result of 28 mg/kg occurred at SS200193, which is in the 903 Pad area. Because only two results exceeded the background $UTL_{99/99}$, but no statistical difference from background was found, chromium was not considered as a potential OU-wide chemical of concern but was included in the risk-based PRG screen to identify special case ("hot spot") chemicals of concern (Appendix B).

3.3 ELIMINATION OF SEMIVOLATILE ORGANIC COMPOUNDS AS OU-2 CONTAMINANTS IN SURFACE SOIL

The occurrences of the SVOCs benzoic acid, polycyclic aromatic hydrocarbons (PAHs), and bis(2-ethylhexyl)phthalate detected in surface soil samples were evaluated to determine whether or not their presence is likely to be a result of environmental contamination. This evaluation is described below. Detected concentrations of SVOCs in surface soil are displayed in Figure 3-3.

Benzoic acid: Benzoic acid was detected in numerous background and OU-2 surface soil samples, as shown below:

Benzoic Acid

	No. Samples	No. Detects	% Detects	Range (µg/kg)	Detection Limit (µg/kg)
Background	14	7	50	43J - 230J	1600
OU-2	40	36	90	40J - 700J	1600

Concentrations were all estimated values well below the reporting limit of 1600 µg/kg. Of the 36 results in OU-2 samples, 28 fell between 51 and 300 µg/kg, comparable to concentrations detected in background samples; 8 results ranged from 330 to 700 µg/kg. Benzoic acid was reported in samples in the extreme outlying portions of the buffer zone where no other organic contamination was observed (see Figure 3-3). It is probable that the reported results in background and in OU-2 samples are laboratory artifacts. False positives for this compound are common due to cross-contamination from glassware and the chromatographic instruments. Because of the difficulty in obtaining reliable results, this chemical has been removed from the EPA CLP Statement of Work OLM-1.0 and subsequent revisions. Review of the results compared to detection limit also indicates that benzoic acid detections may not be reliable. For example, 34 of the 43 reported detected values (36 site samples and 7 background samples) were less than 20 percent of the quoted quantitation limit. These 34 values are considered unreliable. None of the reported detected values exceeded 50 percent of the quantitation limit. These values are probably unreliable.

In conclusion, benzoic acid is not considered an environmental contaminant in OU-2 and it is eliminated from further evaluation.

PAHs: Several PAHs were detected in as many as 22 of the 40 surface soil samples analyzed for PAHs in OU-2. Of the 40 samples, 6 were collected at biased sampling locations (IHSSs) and 34 were random (grid-based) samples collected across OU-2. The sampling locations and concentrations are shown in Figure 3-3. Concentrations of PAHs measured in the biased samples were comparable to those measured in the random samples. For example, Table 3-3 shows that benzo(a)anthracene ranged from 41 to 130 µg/kg in the random samples and from 51 to 160 µg/kg in the biased samples. The ranges are similar for other PAHs detected in OU-2 surface soil samples (Table 3-3).

PAHs are common products of hydrocarbon combustion, including vehicle emissions, and burning of coal, wood, tobacco, and petroleum-based fuels. Because similar PAH levels are found in random and in biased samples, the detected PAHs are thought to be related to non-waste related activities in OU-2. Therefore, they are not included as OU-2 contaminants in the concentration/toxicity screens. However, to address the uncertainty of the origin of the PAHs in surface soil, risk associated with exposure to PAHs in surface soil will be evaluated in the uncertainty section of the risk assessment.

Bis(2-ethylhexyl)phthalate: Bis(2-ethylhexyl)phthalate, a common field and laboratory contaminant, was detected in numerous background and OU-2 surface soil samples, as shown below:

Bis(2-ethylhexyl)phthalate

	No. Samples	No. Detects	% Detects	Range (µg/kg)	Detection Limit (µg/kg)
Background	18	3	17	35J - 140	330
OU-2	40	9	23	49J - 110J [510]	330

Bis(2-ethylhexyl)phthalate was detected in 9 of 40 (23 percent) surface soil samples widely distributed across OU-2, including locations distant from source areas (see Figure 3-3). Concentrations in most OU-2 samples ranged from 49 to 110 µg/kg (detection limit = 330 µg/kg), and one sample had a concentration of 510 µg/kg. In background samples, bis(2-ethylhexyl)phthalate was detected in 17 percent of the samples in concentrations ranging from 35 to 140 µg/kg. Since the distribution of OU-2 results and background results are similar, and since this compound is a common field and laboratory contaminant, it is concluded that bis(2-ethylhexyl)phthalate in OU-2 samples is not an environmental contaminant and it is eliminated from further evaluation as a chemical of concern.

3.4 CONCENTRATION/TOXICITY SCREENS

Concentration/toxicity screens for surface soils are present in Tables 3-4 and 3-5. All analytes that contribute at least 1 percent of the total risk factor are retained as OU-wide chemicals of concern. OU-wide chemicals of concern are listed below and in Table 3-7:

OU-Wide Chemicals of Concern
Surface Soil

Aroclor-1254
Aroclor-1260
Americium-241
Plutonium-239,240

Aroclor-1254 and Aroclor-1260 were detected at sites SS200293 and SS200393 in the Mound Area (see Figure 3-4). Americium-241 and plutonium-239/240 were detected all across OU-2 (see Figure 3-5).

Compounds that were detected but do not have EPA-established toxicity factors are listed in Table 3-6. Delta-BHC and lead were detected above background levels in surface soils but do not have EPA toxicity factors and therefore, cannot be evaluated in a toxicity- or risk-based screen. The potential contribution of these metals to overall risk will be evaluated qualitatively in the risk assessment.

3.5 RISK-BASED EVALUATION OF INFREQUENTLY DETECTED COMPOUNDS

Special-case chemicals of concern are compounds that are infrequently detected (and therefore, are not potential OU-wide chemicals of concern), but that could pose a health risk if long-term exposure were to occur to the maximum detected concentration. They are identified by comparing the maximum detected concentrations to values equivalent to 1000 times chemical-specific PRGs (DOE 1994). The PRGs are calculated assuming long-term residential exposure. Maximum concentrations of DDT and di-n-butylphthalate (each detected at 3 percent frequency) and chromium (as explained in Section 3.2) were compared to the

screening values (1000x PRGs). The screen is discussed in Appendix B and the results for surface soil are presented in Table B-1.

None of the maximum concentrations of chromium, DDT, or di-n-butylphthalate exceeded the 1000 times PRG value. Therefore, there are no special case chemicals of concern in surface soils for OU-2.

TABLE 3-1
ROCKY FLATS PLANT OU-2
ORGANIC COMPOUNDS AND METALS DETECTED AT 5% OR GREATER FREQUENCY
SURFACE SOIL

	Maximum Detected Conc. (mg/kg)	Detection Frequency %	> Background?
Organic Compounds:			
Aroclor-1254	0.97	5	
Aroclor-1260	0.66	5	
Benzo(a)anthracene	0.16	18	
Benzo(a)pyrene	0.16	18	
Benzo(b)fluoranthene	0.24	23	
Benzo(k)fluoranthene	0.076	5	
Benzoic acid	0.7	93	
Bis(2-ethylhexyl)phthalate	0.51	23	
Chrysene	0.2	28	
Fluoranthene	0.39	48	
Indeno(1,2,3-cd)pyrene	0.083	5	
Phenanthrene	0.23	30	
Pyrene	0.35	55	
Metals:			
Aluminum	18700	100	No
Arsenic	6.7	100	No
Barium	208	100	No
Beryllium	1.3	20	No
Cadmium	2.2	14	No
Chromium	29.5	100	Yes
Cobalt	10.2	100	No
Copper	20.5	100	No
Lead	145	100	Yes
Lithium	22.9	91	No
Manganese	1110	100	No
Nickel	21.6	87	No
Selenium	1.1	28	No
Strontium	100	100	No
Thallium	0.5	6	No
Tin	93.3	29	No
Vanadium	51.1	100	No
Zinc	89.3	100	No

TABLE 3-2
ROCKY FLATS PLANT OU-2
ORGANIC COMPOUNDS AND METALS DETECTED AT LESS THAN 5% FREQUENCY
SURFACE SOIL

	Maximum Detected Conc. (mg/kg)	Detection Frequency %	> Background?
Organic Compounds:			
4,4'-DDT	0.026	3	
delta-BHC	0.023	3	
Benzo(ghi)perylene	0.045	3	
Di-n-butylphthalate	1.0	3	
Metals:			
Cesium	8.7	2	No
Molybdenum	5.3	2	No
Silver	1.2	2	No

TABLE 3-3
ROCKY FLATS PLANT OU-2
CONCENTRATION RANGES OF SELECTED PAHs AT RANDOM AND BIASED SURFACE SOIL SAMPLING LOCATIONS

	Detected Concentration [1], mg/kg	
	Random (grid-based)	Biased (IHSSs)
Benzo(a)anthracene	0.041 - 0.130	0.051 - 0.160
Benzo(a)pyrene	0.048 - 0.140	0.068 - 0.160
Benzo(b)fluoranthene	0.090 -0. 200	0.038 - 0.240
Pyrene	0.054 - 0.260	0.098 - 0.350

[1] Detected concentrations are all estimated values below the reporting limit (0.330 mg/kg).

TABLE 3-4
ROCKY FLATS OU-2
CONCENTRATION/TOXICITY SCREEN
SURFACE SOIL
CARCINOGENS

Chemical	Maximum Detected Conc. (mg/kg)	Inhalation Slope Factor[1]	Oral Slope Factor	Risk Factor	Risk Index	% of Total Risk Factor
Aroclor-1254	0.97	n/a	7.7E+00	7.5E+00	6.0E-01	59.5
Aroclor-1260	0.66	n/a	7.7E+00	5.1E+00	4.0E-01	40.5
Total Risk Factor				1.3E+01		

Slope factors are in units of 1/(mg/kg-day).

n/a = not available.

[1] The inhalation exposure route is considered relatively minor in outdoors compared to ingestion. Therefore oral toxicity factors were used in the screen.

TABLE 3-5
ROCKY FLATS OU-2
CONCENTRATION/TOXICITY SCREEN
SURFACE SOIL
RADIONUCLIDES

Chemical	Maximum Detected Conc. (pCi/g)	Inhalation Slope Factor[1]	Oral Slope Factor	Risk Factor	Risk Index	% of Total Risk Factor
Plutonium-239,	7300	3.8E-08	2.3E-10	1.7E-06	9.8E-01	97.7
Americium-241	160	3.2E-08	2.4E-10	3.8E-08	2.2E-02	2.2
Uranium-238	7.74	5.2E-08	2.8E-11	2.2E-10	1.3E-04	0.0
Radium-226	1.46	3.0E-09	1.2E-10	1.8E-10	1.0E-04	0.0
Strontium-89,90	2.09	6.2E-11	3.6E-11	7.5E-11	4.4E-05	0.0
Uranium-233,23	3.581	2.6E-08	1.6E-11	5.7E-11	3.3E-05	0.0
Uranium-235	0.68	2.5E-08	1.6E-11	1.1E-11	6.3E-06	0.0
Total Risk Factor				1.7E-06		

Slope factors are in units of 1/pCi.

[1] The inhalation exposure route is considered relatively minor in outdoors compared to ingestion. Therefore, oral slope factors were used in the screen.

TABLE 3-6
ROCKY FLATS PLANT OU-2
DETECTED ORGANIC COMPOUNDS AND METALS
ABOVE BACKGROUND WITHOUT EPA TOXICITY FACTORS
SURFACE SOIL

delta-BHC
Lead

TABLE 3-7
ROCKY FLATS PLANT OU-2
CHEMICALS OF CONCERN
SURFACE SOIL

OU-Wide
Aroclor-1254
Aroclor-1260
Americium-241
Plutonium-239/240

4.0
SUBSURFACE SOIL CHEMICALS OF CONCERN

4.1 SUBSURFACE SOIL DATA SET

Chemicals of concern in subsurface soil were selected using data from over 350 samples collected during OU-2 Phase I and Phase II subsurface soil investigations. Because some analytes were added to or removed from laboratory chemicals lists, not all samples were analyzed for the same VOCs, SVOCs, pesticides/PCBs, metals, and radionuclides. Approximately 380 samples were analyzed for VOCs. SVOCs were analyzed for in 214 samples, and pesticide/PCBs were analyzed for in 224 samples. Various metals were analyzed for in 189 to 300 samples, various radionuclides were analyzed for in 49 to 284 samples. The sampling and analytical program is summarized in Tables 2-1 and 2-2. Borehole locations are shown in Figure 4-1.

4.2 BACKGROUND COMPARISON AND FREQUENCY OF DETECTION

Tables 4-1 and 4-2 summarize the maximum detected concentrations, detection frequencies, and results of background comparison in OU-2 subsurface soil samples. Background data for subsurface soils were taken from the Background Geochemical Characterization Report (DOE 1993b). The statistical comparisons of inorganic results to background data are presented in detail in Appendix A.

Radionuclides are assumed to be detected at 100 percent frequency, and radionuclides above background levels are listed in the concentration/toxicity screen in Table 4-5.

Analytes above background that were detected at 5 percent or greater detection frequency were included in the concentration/toxicity screens to select OU-wide chemicals of concern, with the following exceptions:

Analytes Excluded as OU-Wide Potential Chemicals of Concern

Analyte	Statistically > Background[1]	Background $UTL_{99/99}$	No. Results > $UTL_{99/99}$	Maximum Concentration
Chromium	No	89.1 mg/kg	1	127 mg/kg
Cobalt	No	38.1 mg/kg	1	38.5 mg/kg
Manganese	No	1194 mg/kg	1	3160 mg/kg
Mercury	No	2.1 mg/kg	2	114 mg/kg
Silver	No	33.1 mg/kg	2	96.5 mg/kg
Zinc	No	182.9 mg/kg	2	437 mg/kg

[1] See Appendix A.

None of these analytes were significantly different than background according to the formal statistical tests described in Appendix A. In addition, only one or two sample results exceeded the background $UTL_{99/99}$. Results above the $UTL_{99/99}$ can indicate hot spots. Figures 4-2a through 4-2c show the locations of the few results that exceed that background $UTL_{99/99}$. Some sample locations are associated with IHSSs and others are not. Therefore, these analytes were not considered as potential OU-wide chemicals of concern in subsurface soil, but were included in the risk-based PRG screen to identify special-case chemicals of concern (Appendix B).

4.3 CONCENTRATION/TOXICITY SCREENS

Concentration/toxicity screens for subsurface soil are presented in Tables 4-3 through 4-5. All analytes that contribute at least 1 percent of total risk factor are retained as OU-wide chemicals of concern for quantitative risk assessment. In addition, cadmium is retained as a chemical of concern because:

- It contributes 0.7 percent of the risk factor for noncarcinogenic effects, which is close to 1 percent.

- It represents a relatively high cancer risk only by the inhalation exposure route. Inhalation risks are not assessed in the concentration/toxicity screens because inhalation is usually a relatively insignificant exposure route compared to ingestion. However, since cadmium is carcinogenic only by the inhalation route, it is prudent to retain it as a COC.

Chemicals of concern are listed below and in Table 4-7.

OU-Wide Chemicals of Concern
Subsurface Soil

Arsenic
Cadmium
Tetrachloroethene
Americium-241
Plutonium-239/240
Radium-228
Uranium-233/234
Uranium-238

The distribution of arsenic and cadmium (concentrations above background mean plus two standard deviations) is shown in Figures 4-3a through 4-3e. They were detected in elevated concentrations in some trenches, such as Trench T-3 (IHSS 110) and Trench T-4 (IHSS 111.1) in the Northeast Trenches Area, Trench T-7 (IHSS 111.4), and Trench T-8 (IHSS 111.5) in the Southeast Trenches Area. Other occurrences are scattered throughout OU-2. Data review indicates that most of the elevated concentrations are found in samples collected in the 1987 sampling and analysis program. These results were not validated because the Rocky Flats quality assurance program had not yet been established. Post-1987 samples collected from nearby locations did not confirm the presence of elevated concentrations. Furthermore, elevated concentrations tend to be constant with depth, suggesting the absence of localized contaminant sources (e.g., at the surface or buried within trenches). In addition, some of the highest concentrations were detected at depths of 20 to 44 feet, which are

probably below potential sources in trenches, which are estimated to have depths of 5 to 10 feet. Based on this review, it is questionable whether arsenic and cadmium are actual environmental contaminants in subsurface soils. Nevertheless, as a conservative measure, they are retained as chemicals of concern in subsurface soil.

The distribution of radionuclide chemicals of concern (activities above background mean plus two standard derivations) is shown in Figures 4-4a through 4-4j. Plutonium and americium are the chief radionuclide chemicals of concern. Elevated activities of uranium-233,234 and uranium-238 are associated with americium and plutonium in the Northeast Trenches Area and in the Mound Area. Elevated activities of uranium isotopes also occur in the 903 Pad Area and the Southeast Trenches area, although in these areas elevated uranium is not consistently associated with americium and plutonium.

Radium-228 is also identified as a chemical of concern on the basis of the concentration/toxicity screen (maximum activity = 6.32 pCi/g). Radium-228 was significantly different than background levels according to the statistical tests described in Appendix A, and six results exceeded the background $UTL_{99/99}$ of 2.330 pCi/g. Elevated activities of radium-228 (and radium-226) are not associated with elevated activities of americium and plutonium. For example, in the Southeast Trenches Area (boreholes B218989 and B319789) and east of the Spray Field (B218189), elevated radium results occur at depths of 14 feet to greater than 35 feet below ground surface (bgs), well below the estimated depth of the trenches; no elevated activities of americium or plutonium occur at these depths. Elevated radium results also occur at boreholes 09791 (903 Pad Area) and B315289 and 00291 (both east of the 903 Pad Area), but americium and plutonium are below background levels, except for one result for plutonium at 8 feet. In conclusion, radium is probably not an environmental contaminant in OU-2. However, it is retained as a chemical of concern for risk assessment.

Tetrachloroethene (PCE) is the only volatile organic chemical of concern in subsurface soils. The distribution of PCE and other VOCs in subsurface soils is shown in Figures 4-5a through 4-5e.

Potential chemicals of concern that do not have EPA-established toxicity factors are listed in Table 4-6. These compounds cannot be evaluated in a toxicity- or risk-based screen to select

chemicals of concern. However, their potential contribution to overall risk will be evaluated qualitatively in the risk assessment for OU-2.

4.4 RISK-BASED EVALUATION OF INFREQUENTLY DETECTED COMPOUNDS

Maximum concentrations of 33 VOCs, SVOCs, and pesticide/PCBs detected at < 5 percent frequency and 6 metals (as explained in Section 4.2) were compared to values equivalent to 1000 times chemical-specific PRGs. Although these chemicals were detected in subsurface soil where exposure potential is limited, the PRGs used in this screening evaluation were calculated assuming long-term residential exposure. This approach is extremely conservative, since it assumes a 30-year exposure to chemicals in subsurface soil. The PRGs are used to identify special-case chemicals of concern that could pose a health risk if long-term exposure were to occur in a highly localized area. This screen is discussed in Appendix B and the results for subsurface soil are presented in Table B-2.

None of the chemicals detected at low frequency in subsurface soil exceeded the 1000 times PRG value. Therefore, no special case chemicals of concern were identified in subsurface soil.

In addition, there are 8 chemicals detected at low frequency that do not have PRGs because of the absence of toxicity factors. These could not be evaluated in the PRG screen. These chemicals are listed in Table B-4.

TABLE 4-1
ROCKY FLATS PLANT OU-2
ORGANIC COMPOUNDS AND METALS DETECTED AT 5% OR GREATER FREQUENCY SUBSURFACE SOIL

	Maximum Detected Conc. (mg/kg)	Detection Frequency %	> Background?
Organic Compounds:			
1,1,1-Trichloroethane	13	5	
1,2-Dichloroethane	0.12	9	
2-Butanone	0.15	6	
Acetone	26	38	
Bis(2-ethylhexyl)phthalate	12	38	
Di-n-butylphthalate	3.4	26	
Methylene chloride	29	28	
N-nitrosodiphenylamine	0.28	13	
Tetrachloroethene	13000	13	
Toluene	7.6	38	
Metals:			
Aluminum	27900	100	No
Antimony	26.8	8	No
Arsenic	30.8	94	Yes
Barium	589	83	Yes
Beryllium	22.9	49	No
Cadmium	10.5	34	Yes
Cesium	5.1	63	No
Chromium	127	98	Yes
Cobalt	38.5	53	Yes
Copper	132	86	Yes
Lead	86.4	100	Yes
Lithium	32.9	75	No
Manganese	3160	100	Yes
Mercury	114	24	Yes
Molybdenum	18.7	22	No
Nickel	33.8	82	No
Silver	96.5	13	Yes
Strontium	459	78	No
Thallium	0.7	17	No
Tin	59.3	21	No
Vanadium	80.4	97	No
Zinc	437	100	Yes

TABLE 4-2
ROCKY FLATS PLANT OU-2
ORGANIC COMPOUNDS AND METALS DETECTED AT LESS THAN 5% FREQUENCY
SUBSURFACE SOIL

	Maximum Detected Conc. (mg/kg)	Detection Frequency %	> Background?
Organic Compounds:			
1,1,2,2-Tetrachloroethane	0.005	0.3	
1,2-Dichloroethene	0.09	1	
1,3-Dichloropropene, cis	0.006	0.3	
1,4-Dichlorobenzene	0.043	0.5	
2-Chloroethyl vinyl ether	0.031	1	
2-Methylnaphthalene	8.1	1	
2-Methylphenol	0.45	0.5	
4,4'-DDT	0.14	0.4	
4-Methyl-2-pentanone	0.011	0.3	
4-Methylphenol	2.9	0.5	
4-Nitroaniline	1.6	0.5	
Acenaphthene	0.28	1	
Anthracene	0.26	0.5	
Aroclor-1254	8.9	3	
Benzene	0.012	0.3	
Benzo(a)anthracene	0.53	0.5	
Benzo(a)pyrene	0.48	1	
Benzo(b)fluoranthene	0.82	0.5	
Benzo(ghi)perylene	0.36	0.5	
Benzoic acid	0.4	1	
Butyl benzylphthalate	0.52	0.5	
Carbon disulfide	0.14	0.3	
Carbon tetrachloride	140	4	
Chloroethane	0.007	0.3	
Chloroform	8.8	3	
Chrysene	0.42	1	
Di-n-octylphthalate	0.26	0.5	
Ethylbenzene	0.026	2	
Fluoranthene	1	2	
Fluorene	0.19	0.5	
Hexachlorobutadiene	0.17	0.5	
Hexachloroethane	1.1	0.5	
Indeno(1,2,3-cd)pyrene	0.33	0.5	
Naphthalene	2	1	
Pentachlorophenol	0.095	1	
Phenanthrene	2.7	2	
Pyrene	1.3	2	
Styrene	0.017	0.3	
Total xylenes	0.23	4	
Trichloroethene	120	4	
Metals:			
Selenium	0.5	4	No

TABLE 4-3
ROCKY FLATS OU-2
CONCENTRATION/TOXICITY SCREEN
SUBSURFACE SOIL
NONCARCINOGENS

Chemical	Maximum Detected Conc. (mg/kg)	Inhalation RfD(1)	Oral RfD	Risk Factor	Risk Index	% of Total Risk Factor
Tetrachloroethene	13000	n/a	1.0E-02	1.3E+06	9.1E-01	91.4
Arsenic	30.8	n/a	3.0E-04	1.0E+05	7.2E-02	7.2
Cadmium	10.5	n/a	1.0E-03	1.1E+04	7.4E-03	0.7
Barium	589	1.4E-04	7.0E-02	8.4E+03	5.9E-03	0.6
Bis(2-ethylhexyl)phthalate	12	n/a	2.0E-02	6.0E+02	4.2E-04	0.0
Methylene chloride	29	9.0E-01	6.0E-02	4.8E+02	3.4E-04	0.0
Acetone	26	n/a	1.0E-01	2.6E+02	1.8E-04	0.0
Toluene	7.6	1.1E-01	2.0E-01	3.8E+01	2.7E-05	0.0
Di-n-butylphthalate	3.4	n/a	1.0E-01	3.4E+01	2.4E-05	0.0
2-Butanone	0.15	3.0E-01	6.0E-01	2.5E-01	1.8E-07	0.0
Total Risk Factor				1.4E+06		

RfDs are in units of mg/kg/day.
n/a= not available.

(1) The inhalation exposure route is considered relatively minor in outdoors compared to ingestion. Therefore, oral toxicity factors were used in the screen.

TABLE 4-4
ROCKY FLATS OU-2
CONCENTRATION/TOXICITY SCREEN
SUBSURFACE SOIL
CARCINOGENS

Chemical	Maximum Detected Conc. (mg/kg)	Inhalation Slope Factor(1)	Oral Slope Factor	Risk Factor	Risk Index	% of Total Risk Factor
Tetrachloroethene	13000	2.0E-03	5.2E-02	6.8E+02	9.3E-01	92.8
Arsenic	30.8	1.5E+01	1.7E+00	5.2E+01	7.2E-02	7.2
Methylene chloride	29	1.6E-03	7.5E-03	2.2E-01	3.0E-04	0.0
Bis(2-ethylhexyl)phthalate	12	n/a	1.4E-02	1.7E-01	2.3E-04	0.0
1,2-Dichloroethane	0.12	9.1E-02	9.1E-02	1.1E-02	1.5E-05	0.0
N-nitrosodiphenylamine	0.28	n/a	4.9E-03	1.4E-03	1.9E-06	0.0
Cadmium	10.5	6.3E+00	n/a	-	-	-
Total Risk Factor				7.3E+02		

Slope factors are in units of 1/(mg/kg-day).
n/a = not available.

(1) The inhalation exposure route is considered relatively minor is outdoors compared to ingestion. Therefore, oral toxicity factors were used in the screen.

TABLE 4-5
ROCKY FLATS OU-2
CONCENTRATION/TOXICITY SCREEN
SUBSURFACE SOIL
RADIONUCLIDES

Chemical	Maximum Detected Conc. (pCi/g)	Inhalation Slope Factor(1)	Oral Slope Factor	Risk Factor	Risk Index	% of Total Risk Factor
Plutonium-239,240	180	3.8E-08	2.3E-10	4.1E-08	7.6E-01	76.5
Americium-241	22	3.2E-08	2.4E-10	5.3E-09	9.8E-02	9.8
Uranium-238	113.1	5.2E-08	2.8E-11	3.2E-09	5.9E-02	5.9
Uranium-233,234	191.7	2.6E-08	1.6E-11	3.1E-09	5.7E-02	5.7
Radium-228	6.32	6.6E-10	1.0E-10	6.3E-10	1.2E-02	1.2
Radium-226	1.9	3.0E-09	1.2E-10	2.3E-10	4.2E-03	0.4
Uranium-235	11.5	2.5E-08	1.6E-11	1.8E-10	3.4E-03	0.3
Cesium-137	4.7	1.9E-11	2.8E-11	1.3E-10	2.4E-03	0.2
Strontium-89,90	1.1	6.2E-11	3.6E-11	4.0E-11	7.3E-04	0.1
Total Risk Factor				5.4E-08		

Slope factors are in units of 1/pCi.

(1) The inhalation exposure route is considered relativley minor in outdoors compared to ingestion. Therefore, oral slope factors were used in the screen.

TABLE 4-6
ROCKY FLATS PLANT OU-2
DETECTED ORGANIC COMPOUNDS AND METALS ABOVE BACKGROUND WITHOUT TOXICITY FACTORS SUBSURFACE SOIL

Benzo(g,h,i)perylene
2-Chloroethyl vinyl ether
Copper
Lead
4 -Methylnaphthalene
4 -Nitroaniline
Phenanthrene
1,1,1-Trichloroethane

TABLE 4-7
ROCKY FLATS PLANT OU-2
CHEMICALS OF CONCERN
SUBSURFACE SOIL

OU-Wide
Arsenic
Cadmium
Tetrachloroethene
Americium-241
Plutonium-239/240
Radium-228
Uranium-233-234
Uranium-238

5.0
GROUNDWATER CHEMICALS OF CONCERN

5.1 GROUNDWATER DATA SET

Monitoring wells installed in the UHSU were used to characterize UHSU groundwater in OU-2. Chemicals of concern in groundwater were selected using samples collected from second quarter of 1991 through fourth quarter of 1992. Groundwater samples were analyzed for metals and radionuclides in filtered and unfiltered samples and for VOCs, SVOCs, pesticides/PCBs, and water quality parameters. The sampling and analytical programs for wells in OU-2 are summarized in Tables 2-3 and 2-4. Groundwater monitoring well locations are shown in Figure 5-1.

5.2 BACKGROUND COMPARISON AND FREQUENCY OF DETECTION

Tables 5-1 and 5-2 summarize the maximum detected concentrations, detection frequencies, and results of background comparison for analytes detected in groundwater. The background comparison and maximum concentrations shown for metals and radionuclides are based on unfiltered sample results.

The statistical background comparisons for inorganics are presented in detail in Appendix A. Background data for UHSU groundwater were taken from the Background Geochemical Characterization Report (DOE 1993b). Inspection of Table 5-1 and the appendix tables for metals in unfiltered groundwater samples reveals that nearly all metals, including typical rock-forming elements such as aluminum, calcium, iron, and sodium, were identified as being above background levels. Metals as potential chemicals of concern are discussed further in Section 5.3.

Radionuclides are assumed to be detected at 100 percent frequency, and radionuclides above background levels are listed in the concentration/toxicity screen in Table 5-5.

Several chlorinated solvents and other organic contaminants were detected in wells at maximum concentrations ranging from 0.3 µg/L (for several compounds) to 150,000 µg/L for

trichloroethene. Detection frequencies for volatile organic analytes ranged from 0.2 percent to 68 percent.

5.3 ELIMINATION OF SELECTED METALS AS CONTAMINANTS OF CONCERN IN GROUNDWATER

As shown in Table 5-1 and Appendix A, nearly all metals analyzed for in unfiltered groundwater samples were identified as being above background levels, including aluminum, calcium, iron, potassium, and sodium, which are common rock-forming minerals and not likely to be environmental contaminants in OU-2. All but two metals failed the formal statistical background comparison and all had between 2 (molybdenum) and 142 (potassium) results above the background $UTL_{99/99}$.

Because it is unusual, even at hazardous waste sites, to see so many metals above background levels in groundwater, an evaluation was conducted to ascertain whether elevated concentrations of manganese, antimony, aluminum, beryllium, and vanadium in OU-2 groundwater samples were due to factors other than environmental contamination. Manganese, antimony, aluminum, beryllium, and vanadium were evaluated since the presence of these metals at their respective maximum concentrations tend to drive risk. The evaluation consisted of (1) examining the spatial and temporal distribution of the metals and (2) examining the relationship of results for unfiltered samples to results for filtered samples and to total suspended solids.

The conclusion of the following evaluation was that the elevated concentrations of these metals are not related to environmental contamination but rather to local geochemical conditions and to suspended solids in the groundwater samples. Therefore, these metals should not be considered chemicals of concern in groundwater in OU-2, and they have been excluded from the concentration/toxicity screens to select OU-wide chemicals of concern. The rationale for this conclusion is presented below. Locations of elevated concentrations of these metals for unfiltered samples are shown in Figures 5-2a through 5-2c.

- Presence of naturally occurring zones of high manganese: The results of the background comparison suggest that local geochemical conditions in OU-2 are different than those at the background sampling locations. The occurrence of

elevated manganese and iron suggest the presence of naturally occurring mineralization in OU-2 that is absent in the background sampling locations. Elevated concentrations of manganese and iron occur in both filtered and unfiltered samples. Recent investigations at the Rocky Flats Environmental Technology Site indicate wide and irregular distribution of dissolved manganese at high concentrations in UHSU groundwater; none of the background wells used for the Background Characterization Report were located in the recently identified areas of elevated manganese (Siders 1994). Therefore, it is probable that the background comparison gives misleading results and that the elevated concentrations of manganese and iron in OU-2 groundwater are due to local geochemical conditions. Further discussion is provided in Appendix C, "Evaluation of Manganese and Antimony in UHSU Groundwater."

- Temporal pattern for antimony: The temporal occurrence of concentrations above background $UTL_{99/99}$ was evaluated for antimony. For example concentrations of total antimony exceeded background UTL in 29 OU-2 wells at which multiple (3 to 5) sampling rounds were conducted (Figure 5-2b). However, in 27 of the wells, the UTL was exceeded in only one sampling event, and in the remaining two wells the UTL was exceeded in two sampling events. In addition, in 24 of the wells, the single exceedance of background UTL occurred in 1991 sampling events and did not occur in any sampling event in 1992. The temporal isolation of elevated concentrations of antimony is probable related to sampling artifacts, as discussed in Appendix C. Therefore, antimony is not considered to be an environmental contaminant in UHSU groundwater in OU-2.

- Strong correlation of elevated aluminum, beryllium, and vanadium with total suspended solids (TSS): The magnitude of metals concentrations, and the number of elevated metals in a sample, strongly correlate with high TSS in samples. TSS concentrations in many samples was as high as 1,000 to 32,000 mg/L. These samples had high metals concentrations as well. High TSS is not a sign of contamination but rather is related to sample turbidity, often resulting from well development and sampling procedures. As an example,

samples from well 06991, which is located in the 903 Pad Area, contained elevated levels of aluminum, beryllium, and vanadium as well as other metals, in three consecutive sampling rounds. These same samples had TSS values as high as 32,000 mg/L (average = 12,390 mg/L). Field notes indicate all samples were cloudy, muddy, or colored. On the other hand, samples from well 06891, which is adjacent to well 06991 (Figures 5-2b and 5-2c), had TSS values ranging from 298 to 380 mg/L in the same three sampling events and did not have a single occurrence of aluminum, beryllium, or vanadium exceeding background UTL. Analytical results for aluminum, beryllium, vanadium, TSS and total dissolved solids (TDS) are shown in Appendix C.

- Absence of elevated aluminum, beryllium, and vanadium in filtered samples: While aluminum, beryllium, and vanadium all have several occurrences above the background UTL in unfiltered samples, there are no occurrences of any of these metals above background UTL in filtered samples, nor did they exceed background levels according to the formal statistical comparison (see Appendix A). The low concentrations in the filtered fraction indicate that the metals are not being mobilized into the aqueous phase, as can occur in the presence of waste-related leachate. This is further evidence that the elevated totals metals results are related to suspended solids, and are not due to environmental contamination.

It is concluded that elevated concentrations of manganese, antimony, aluminum, beryllium, and vanadium in OU-2 groundwater samples are related to suspended solids in the samples and to naturally occurring geochemical characteristics such as high manganese zones. These metals are therefore eliminated from further consideration as contaminants of concern in groundwater in OU-2. Other metals that were identified as being above background levels are probably also due to suspended solids in the samples and local geochemistry. However, other metals were not likely to be risk drivers based on maximum concentrations so they were not evaluated in detail.

5.4 CONCENTRATION/TOXICITY SCREENS

Concentration/toxicity screens for organic contaminants and radionuclides are presented in Tables 5-3 through 5-5. Organic analytes detected at a frequency of 5 percent or greater, nitrate, metals above background not eliminated in Section 5.3, and radionuclides above background levels were included in the screens.

All analytes that contribute at least 1 percent of the total risk factor are retained as OU-wide chemicals of concern for quantitative risk assessment.

The distributions of chemicals of concern in groundwater are shown in Figure 5-3a and b (VOCs) and Figure 5-4 (radionuclides). Chemicals of concern in OU-2 groundwater are listed below and in Table 5-7.

OU-Wide Chemicals of Concern
Groundwater

1,1-Dichloroethene
Carbon tetrachloride
Chloroform
Methylene chloride
Tetrachloroethene
Trichloroethene
Plutonium-239/240
Americium-241

5.5 RISK-BASED EVALUATION OF INFREQUENTLY DETECTED COMPOUNDS

Maximum concentrations of 23 VOCs, SVOCs, and pesticides detected at <5 percent frequency were compared to values equivalent to 1000 times chemical-specific PRGs for drinking water. The PRGs were calculated assuming residential use of groundwater and are used to identify special case chemicals of concern that could pose a health risk if long-term exposure were to occur to maximum concentrations in a highly localized area. The screen

is discussed in Appendix B and the results for groundwater are presented in Table B-3. An additional 23 chemicals detected at low frequency in groundwater did not have PRGs available and could not be evaluated. These chemicals are listed in Table 5-4.

Maximum concentrations of 1,1,2,2-tetrachloroethane, cis-1,3-dichloropropene, and vinyl chloride all exceeded the 1000 times PRG values. These three compounds will be retained for further evaluation as special case chemicals of concern. They are listed in Table 5-7.

TABLE 5-1
ROCKY FLATS PLANT OU-2
ORGANIC COMPOUNDS AND METALS DETECTED AT 5% OR GREATER FREQUENCY
UHSU GROUNDWATER

	Maximum Detected Conc. (mg/L)	Detection Frequency %	> Background?
Organic Compounds:			
1,1,1-Trichloroethane	1	25	
1,1-Dichloroethane	0.66	13	
1,1-Dichloroethene	0.38	26	
1,2-Dichloroethene	0.17	34	
1,2-Dichloroethene, cis	1.70	45	
1,2-Dichloroethene, trans	0.03	8	
Acetone	0.28	6	
Benzene	0.038	5	
Bis(2-ethylhexyl)phthalate	0.017	29	
Bromodichloromethane	0.19	6	
Carbon tetrachloride	20	60	
Chloroform	39	55	
Diethyl phthalate	0.31	11	
Methylene chloride	35	18	
Naphthalene	0.085	9	
Tetrachloroethene	14	68	
Toluene	0.11	10	
Trichloroethene	150	61	
Metals and other inorganics (unfiltered samples):			
Aluminum	1460	99	Yes
Antimony	0.297	22	Yes
Arsenic	0.021	60	Yes
Barium	11.3	94	Yes
Beryllium	0.114	43	Yes
Cadmium	0.078	25	Yes
Chromium	3.36	77	Yes
Cobalt	0.651	61	Yes
Copper	1.31	66	Yes
Lead	0.675	93	Yes
Lithium	0.842	86	Yes
Manganese	24	99	Yes
Mercury	0.005	13	Yes
Molybdenum	0.389	25	Yes
Nickel	2.01	76	Yes
Selenium	0.3	32	Yes
Silver	0.057	12	Yes
Strontium	4.24	100	Yes
Thallium	0.006	13	No
Tin	0.642	15	Yes
Vanadium	3.14	83	Yes
Zinc	5.29	96	Yes
Nitrate	444	92	

TABLE 5-2
ROCKY FLATS PLANT OU-2
ORGANIC COMPOUNDS AND METALS DETECTED AT LESS THAN 5% FREQUENCY
UHSU GROUNDWATER

	Maximum Detected Conc. (mg/L)	Detection Frequency %	> Background?
Organic Compounds:			
1,1,1,2-Tetrachloroethane	0.003	3	
1,1,2,2-Tetrachloroethane	0.18	2	
1,1,2-Trichloroethane	0.021	2	
1,1-Dichloropropene	0.0001	0.4	
1,2,3-Trichlorobenzene	0.0004	2	
1,2,3-Trichloropropane	0.002	1	
1,2,4-Trichlorobenzene	0.002	1	
1,2,4-Trimethylbenzene	0.0006	1	
1,2-Dibromo-3-chloropropane	0.004	1	
1,2-Dibromoethane	0.013	1	
1,2-Dichloroethane	0.006	2	
1,2-Dichloropropane	0.001	0.2	
1,3-Dichloropropene, cis	1.6	1	
1,3-Dichloropropene, trans	0.008	1	
1,3-Dichlorobenzene	0.002	1	
1,3-Dichloropropane	0.0003	0.4	
1,3,5-Trimethylbenzene	0.001	1	
1,4-Dichlorobenzene	0.0003	1	
2-Hexanone	0.005	1	
4-Methyl-2-pentanone	0.01	1	
Benzoic acid	0.056	3	
Bromobenzene	0.001	1	
Bromochloromethane	0.71	2	
Bromoform	0.006	1	
Bromomethane	0.001	0.3	
Carbon disulfide	0.0005	1	
Chlorobenzene	0.016	1	
Chloroethane	0.002	1	
Chloromethane	0.32	1	
Di-n-butylphthalate	0.003	3	
Dibromochloromethane	0.002	0.2	
Dibromomethane	1.7	0.4	
Dichlorodifluoromethane	0.005	1	
Ethylbenzene	0.015	1	
Heptachlor epoxide	0.00007	3	
Hexachlorobutadiene	0.0006	2	
m+p Xylene	0.0003	2	
m-Xylene	0.0003	2	
n-Butylbenzene	0.001	1	
o-Chlorotoluene	0.0003	0.4	
o-Xylene	0.0003	2	

TABLE 5-2 (continued)
ROCKY FLATS PLANT OU-2
ORGANIC COMPOUNDS AND METALS DETECTED AT LESS THAN 5% FREQUENCY
UHSU GROUNDWATER

	Maximum Detected Conc. (mg/L)	Detection Frequency %	> Background
Organic Compounds:			
p-Chlorotoluene	0.0003	0.3	
p-Cymene	0.0001	3	
p-Xylene	0.0002	1	
sec-Butylbenzene	0.23	4	
Styrene	0.014	2	
tert-Butylbenzene	0.0004	0.3	
Trichlorofluoromethane	0.0006	3	
Vinyl chloride	0.86	3	
Xylenes, total	0.053	1	
Metals (unfiltered samples):			
Cesium	0.06	2	No

TABLE 5-3
ROCKY FLATS OU-2
CONCENTRATION/TOXICITY SCREEN
UHSU GROUNDWATER
NONCARCINOGENS

Chemical	Maximum Detected Conc. (mg/L)	Inhalation RfD	Oral RfD	Risk Factor	Risk Index	% of Total Risk Factor
Carbon tetrachloride	20	n/a	7.0E-04	2.9E+04	8.0E-01	80.0
Chloroform	39	n/a	1.0E-02	3.9E+03	1.1E-01	10.9
Tetrachloroethene	14	n/a	1.0E-02	1.4E+03	3.9E-02	3.9
Methylene chloride	35	9.0E-01	6.0E-02	5.8E+02	1.6E-02	1.6
Nitrate[1]	444	n/a	1.6E+00	2.8E+02	7.8E-03	0.8
cis-1,2-Dichloroethen	1.7	n/a	1.0E-02	1.7E+02	4.8E-03	0.5
Barium	11.3	1.4E-04	7.0E-02	1.6E+02	4.5E-03	0.5
Cadmium	0.078	n/a	5.0E-04	1.6E+02	4.4E-03	0.4
Nickel	2.01	n/a	2.0E-02	1.0E+02	2.8E-03	0.3
Molybdenum	0.389	n/a	5.0E-03	7.8E+01	2.2E-03	0.2
Arsenic	0.021	n/a	3.0E-04	7.0E+01	2.0E-03	0.2
Selenium	0.3	n/a	5.0E-03	6.0E+01	1.7E-03	0.2
Lithium	0.8	n/a	2.0E-02	4.2E+01	1.2E-03	0.1
1,1-Dichloroethene	0.38	n/a	9.0E-03	4.2E+01	1.2E-03	0.1
Zinc	5.29	n/a	3.0E-01	1.8E+01	4.9E-04	0.0
1,2-Dichloroethene	0.15	n/a	9.0E-03	1.7E+01	4.7E-04	0.0
Mercury	0.005	9.0E-05	3.0E-04	1.7E+01	4.7E-04	0.0
Silver	0.057	n/a	5.0E-03	1.1E+01	3.2E-04	0.0
Tin	0.642	n/a	6.0E-02	1.1E+01	3.0E-04	0.0
Bromodichlorometha	0.19	n/a	2.0E-02	9.5E+00	2.7E-04	0.0
Strontium	4.24	n/a	6.0E-01	7.1E+00	2.0E-04	0.0
1,1-Dichloroethane	0.66	1.4E-01	1.0E-01	6.6E+00	1.8E-04	0.0
Cobalt	0.65	n/a	1.8E-01	3.6E+00	1.0E-04	0.0
Chromium	3.36	n/a	1.0E+00	3.4E+00	9.4E-05	0.0
Acetone	0.28	n/a	1.0E-01	2.8E+00	7.8E-05	0.0
Naphthalene	0.085	n/a	4.0E-02	2.1E+00	5.9E-05	0.0
trans-1,2-Dichloroeth	0.034	n/a	2.0E-02	1.7E+00	4.8E-05	0.0
Toluene	0.11	1.1E-01	2.0E-01	1.0E+00	2.8E-05	0.0
Bis(2-ethylhexyl)phth	0.017	n/a	2.0E-02	8.5E-01	2.4E-05	0.0
Diethyl phthalate	0.31	n/a	8.0E-01	3.9E-01	1.1E-05	0.0
Total Risk Factor				3.6E+04		

RfDs are in units of mg/kg/day.
n/a= not available.

[1] Maximum concentration of nitrate is a spatially isolated extreme value.

TABLE 5-4
ROCKY FLATS OU-2
CONCENTRATION/TOXICITY SCREEN
UHSU GROUNDWATER
CARCINOGENS

Chemical	Maximum Detected Conc. (mg/L)	Inhalation Slope Factor	Oral Slope Factor	Risk Factor	Risk Index	% of Total Risk Factor
Carbon tetrachloride	20	5.2E-02	1.3E-01	2.6E+00	3.0E-01	30.1
Trichloroethene	150	6.0E-03	1.1E-02	1.7E+00	1.9E-01	19.1
Tetrachloroethene	14	2.0E-03	5.2E-02	7.3E-01	8.4E-02	8.4
Methylene chloride	35	1.6E-03	7.5E-03	2.6E-01	3.0E-02	3.0
Chloroform	39	8.0E-02	6.1E-03	3.1E+00	3.6E-01	36.1
1,1-Dichloroethene	0.38	1.7E-01	6.0E-01	2.3E-01	2.6E-02	2.6
Arsenic	0.021	1.5E+01	1.7E+00	3.6E-02	4.1E-03	0.4
Bromodichloromethane	0.19	n/a	6.2E-02	1.2E-02	1.4E-03	0.1
Benzene	0.038	2.9E-02	2.9E-02	1.1E-03	1.3E-04	0.0
Bis(2-ethylhexyl)phthalate	0.017	n/a	1.4E-02	2.4E-04	2.8E-05	0.0
Cadmium	0.078	6.3E+00	n/a	-	-	-
Total Risk Factor				8.6E+00		

Slope factors are in units of 1/(mg/kg-day).
n/a = not available.

TABLE 5-5
ROCKY FLATS OU-2
CONCENTRATION/TOXICITY SCREEN
UHSU GROUNDWATER
RADIONUCLIDES

Chemical	Maximum Detected Conc. (pCi/L)	Inhalation Slope Factor	Oral Slope Factor[1]	Risk Factor	Risk Index	% of Total Risk Factor
Plutonium-239,240	354.6	3.8E-08	2.3E-10	8.2E-08	8.8E-01	87.7
Americium-241	46.54	3.2E-08	2.4E-10	1.1E-08	1.2E-01	12.0
Strontium-89,90	6.7	6.2E-11	3.6E-11	2.4E-10	2.6E-03	0.3
Cesium-137	1.799	1.9E-11	2.8E-11	5.0E-11	5.4E-04	0.1
Total Risk Factor				9.3E-08		

Slope factors are in units of 1/pCi.

[1] Oral toxicity factors were used in the screen since ingestion is the chief exposure route for groundwater.

TABLE 5-6
ROCKY FLATS PLANT OU-2
DETECTED ORGANIC COMPOUNDS AND METALS
WITHOUT EPA TOXICITY FACTORS
UHSU GROUNDWATER

Bromochloromethane
n-Butylbenzene
Chloromethane
p-Chlorotoluene
Copper[1]
p-Cymene
1,1-Dichloropropene
1,3-Dichlorobenzene
2-Hexanone
Lead
1,1,1-Trichloroethane
1,2,3-Trichlorobenzene
1,2,4-Trimethylbenzene
1,3,5-Trimethylbenzene

[1] 1.3 mg/l copper is the federal action level for tap water.

TABLE 5-7
ROCKY FLATS PLANT OU-2
CHEMICALS OF CONCERN
UHSU GROUNDWATER

OU-Wide	Special Case[1]
1,1-Dichloroethene	1,1,2,2-Tetrachloroethane
Carbon tetrachloride	cis-1,3-Dichloropropene
Chloroform	Vinyl chloride
Methylene chloride	
Tetrachloroethene	
Trichloroethene	
Americium-241	
Plutonium-239/240	

[1] See Appendix B

6.0
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APPENDIX A
BACKGROUND COMPARISON FOR METALS AND RADIONUCLIDES

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Concentrations of metals and radionuclides measured in surface soil, subsurface soil, and groundwater in OU-2 were compared to background concentrations in order to identify OU-2 analytes whose concentrations are statistically higher than background levels. These analytes are then identified as potential chemicals of concern for further evaluation. The background data used for comparison were reported in the Background Geochemical Characterization Report (DOE 1993), except for surface soil data, which were not available in the 1993 report. The background surface soil data were collected in the Rock Creek Area during the 1991 OU-1 Phase III investigation and the 1993 OU-2 Phase II investigation. Analytical results from each medium were sampled were pooled, and the background comparison was performed on an OU-wide basis.

The procedures applied in the background comparison are shown in the flow chart in Figure A-1. Three major steps were involved: (1) data aggregation, (2) statistical background comparisons, and (3) statistical professional judgment. Each of these steps is discussed below.

A.1 DATA AGGREGATION

The chemical data were grouped by medium into three categories: (1) surface soil, (2) subsurface soil above the water table, and (3) groundwater (UHSU). In general, each medium has 29 analytes for metals and 13 analytes for radionuclides, analyzed in unfiltered and filtered samples. There are a total of 8 media-analyte groups to be evaluated in the background comparisons, as shown in Table A-1.

All of OU-2 media-analyte groups were compared directly to the corresponding background groups.

A.2 STATISTICAL BACKGROUND COMPARISON

Background comparisons were performed according to the procedures given in the "Guidance Document, Statistical Comparisons of Site-to-Background Data in Support of RFI/RI Investigations (EG&G 1994), which was primarily based on the methodology proposed by Gilbert (Gilbert 1993). The formal statistical tests were the Gehan test, Slippage test, Quantile test, and t-test. Analytical results were also compared to the upper tolerance limit ($UTL_{99/99}$) of background to identify high concentrations out of background range. The conditions for applying each of the tests are briefly discussed below.

A.2.1 Formal Statistical Tests

Four formal statistical test were performed to test the difference between the background and site populations. If any of the four statistical test was significant, the analyte was considered to be a potential chemical of concern. Significance was defined as a p-value less than or equal to 0.05, the Type I (false positive) error rate. Non-detects of metals were treated as described below for each test. All the radionuclide results were treated as detects.

Gehan Test

The Gehan test (Gehan 1965, explained in Gilbert 1993) is non-parametric ranking test. It was performed for all the media-analyte groups. For non-detects, the reporting limits were used for ranking purposes.

Slippage Test

The slippage test (Rosenbaum 1954), a non-parametric test, was performed by comparing the OU-2 measurements to the maximum background measurement (detect or non-detect). The p-value for the probability of the number of site measurements greater than the maximum background measurement was calculated. Reporting limits were used for non-detects.

Quantile Test

The Quantile test (Gilbert and Simpson 1992), a non-parametric test, was performed by first ranking the combined background and OU-2 measurements from largest to smallest. If there were no non-detects among the top 20% of the combined background and OU-2 measurements, the probability of the number of site measurements within the top 20% of the data set was calculated. If there were any non-detects among the top 20% of the measurements, no Quantile test was performed.

t-Test

The t-test, a parametric statistical test, was performed if these conditions were met: (1) the non-detects in each of the data sets is less than 20% of the measurements; and (2) EITHER each the data sets contains at least 20 points, OR both of the data sets are normally distributed.

For simplicity, the t-test was only performed when condition (1) and the first option of condition (2) were met. Non-detect results for metals were replaced by one-half the reporting limits.

The homogeneity of the variance was tested following Levene's test (EPA 1992). If the variances from both data sets were the same, the standard t-test was performed. If the variances were not the same, the unequal variance t-test (Helsel and Hirsch 1992) was performed.

A.2.2 Upper Tolerance Limit ($UTL_{99/99}$) Comparison

For each media-analyte in the background data, an upper tolerance limit with 99% confidence and 99% coverage ($UTL_{99/99}$) was calculated, assuming the background data were normally distributed (EG&G 1994). In calculating the UTL, if non-detects were less than 80% of the data, one-half the reporting limit was used as the result for non-detect samples. Otherwise, the maximum background measurement, instead of the $UTL_{99/99}$, was used in the comparisons. For the radionuclides, all results were treated as detects (EG&G 1994).

Each of the OU-2 measurements was compared to the $UTL_{99/99}$. If one or more OU-2 measurements exceed the background $UTL_{99/99}$, the analyte was considered as a potential chemical of concern for further evaluation, even if the analyte did not exceed background levels according to the formal statistical evaluation.

A.3 BACKGROUND COMPARISON RESULTS

The number of inorganic potential chemicals of concern in each media-analyte group resulting from the background comparisons is summarized in Table A-1. The summary tables for the background comparisons for each media-analyte group are presented in the remaining tables in Appendix A.

A.4 STATISTICAL PROFESSIONAL JUDGMENT

Statistical professional judgment was applied for those media-analytes that were below background according to the formal statistical tests but failed to pass the $UTL_{99/99}$ comparisons. The professional judgment consisted of performing a log-normal $UTL_{99/99}$ comparison if the background data were log-normally distributed.

According to the background comparison methodology (EG&G 1994), the $UTL_{99/99}$ was calculated assuming a normal distribution of background data. However, log-normal distribution may better describe some geochemical data, as indicated in the Statistical Analysis of Ground-Water Monitoring Data at RCRA Facilities (EPA 1992). Log-normal based $UTLs_{99/99}$ were calculated for media-analytes that passed the formal statistical tests but failed to pass the normal-based $UTL_{99/99}$ comparison. If a media-analyte passed the log-normal-based $UTL_{99/99}$ comparison, probability plots were generated for both normal and log-normal distributions. If the probability plots indicated that the data better fit a log-normal distribution, the media-analyte was eliminated from the potential chemical of concern list.

A positive constant was added to the radionuclide results (including negative and zero values) to make all the results positive prior to log transformations. The constant was selected to improve the goodness of fit of the appropriate distribution. After the log-normal $UTL_{99/99}$ was calculated based on this shifted distribution, the constant was subtracted from the calculated $UTL_{99/99}$ to get the "true" log-normal $UTL_{99/99}$ value.

The results of the log-normal based $UTL_{99/99}$ comparisons are presented in the remark column in the summary tables. Based on the results of the log-normal $UTL_{99/99}$ comparison, the following eight analytes were eliminated as potential chemicals of concern:

Medium	Analyte
Surface Soil	Lithium
	Magnesium
	Strontium
	Tin
	Zinc
Subsurface Soil	Beryllium
	Magnesium
	Strontium

A.5 REFERENCES

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TABLE A-1
ROCKY FLATS PLANT OU-2
BACKGROUND COMPARISON SUMMARY

Media	Background Data	OU6 Data	Chemical Group	No. of Analytes in Comparison	No. of Analytes Significant in Tests	No. of Analytes Greater than UTL 99/99	No. of PCOC
Subsurface Soil	USHU Subsurface Soil	Subsurface Soil Above Groundwater Table	Metals	28	3	15	12
			Rads	12	8	12	12
Surface Soil	Rock Creek Surface Soil	Surface Soil	Metals	29	2	9	5
			Rads	11	7	6	8
Groundwater	UHSU Groundwater	UHSU Groundwater	Unfiltered Metals	29	24	27	27
			Filtered Metals	28	10	15	16
			Unfiltered Rads	11	4	5	4*
			Filtered Rads	10	7	6	7*

* Some sample sizes too small to draw conclusions.

** Background data files are from "1993 Background Geochemical Characterization Report", except for surface soil.

Table A-2
Rocky Flats Plant OU-2
Background Comparison Summary of
Surface Soil Metals
(Concentration Unit: MG/KG)

ANALYTE	N_B	N_S	DTF_B	DTF_S	P_SLIP	P_QUAN	P_GEHAN	P_T_1	SIGNIFICT	UTL99	NGUTL	PCOC	REMARK
ALUMINUM	18	69	1.00	1.00	0.7931	0.9605	0.9996		N	21915.4	0	NO	
ANTIMONY	18	50	0.00	0.00									NO HIT
ARSENIC	18	69	1.00	1.00	1.0000	1.0000	1.0000		N	12.9	0	NO	
BARIUM	18	69	1.00	1.00	1.0000	1.0000	1.0000		N	528.0	0	NO	
BERYLLIUM	18	69	0.50	0.20	1.0000		0.9254		N	5.2	0	NO	
CADMIUM	17	69	0.35	0.14	1.0000		0.9291		N	5.0	0	NO	
CALCIUM	18	69	1.00	1.00	0.0162	0.2169	0.1852		Y	13573.3	12	YES	
CESIUM	18	51	0.50	0.02	1.0000		0.1292		N	630.8	0	NO	
CHROMIUM	18	69	1.00	1.00	0.6271	0.9906	0.9997		N	24.8	2	YES	
COBALT	18	69	1.00	1.00	1.0000	0.4574	0.4895		N	24.8	0	NO	
COPPER	18	69	1.00	1.00	0.6271	0.7033	0.5993		N	27.3	0	NO	
IRON	18	69	1.00	1.00	0.7931	0.9906	0.9990		N	28160.4	1	YES	
LEAD	18	69	1.00	1.00	0.1846	0.2169	0.4707		N	61.4	3	YES	
LITHIUM	18	44	1.00	0.91	0.0524		0.9948		N	20.0	2	NO	Not a PCOC by P.J. (1)
MAGNESIUM	18	69	1.00	1.00	0.7931	0.9605	0.9323		N	7011.5	1	NO	Not a PCOC by P.J. (1)
MANGANESE	18	69	1.00	1.00	1.0000	0.9275	0.9800		N	2253.5	0	NO	
MERCURY	18	44	0.00	0.00									NO HIT
MOLYBDENUM	18	56	0.06	0.02	0.1289		0.0508		N	40.0	0	NO	
NICKEL	18	69	1.00	0.87	0.7931	0.9605	0.9018		N	26.9	0	NO	
POTASSIUM	18	69	1.00	1.00	0.4943	0.9605	0.9919		N	5256.8	0	NO	
SELENIUM	18	69	0.72	0.28	1.0000		0.9956		N	1.4	0	NO	
SILICON	18	40	0.94	1.00	0.0401	0.0529	0.0001		Y	3559.7	0	YES	
SILVER	18	64	0.00	0.02	1.0000		0.5000		N	10.0	0	NO	
SODIUM	18	69	0.50	0.26	0.1846		0.8341		N	1108.0	0	NO	
STRONTIUM	18	56	1.00	1.00	0.5702	0.4745	0.7377		N	90.1	2	NO	Not a PCOC by P.J. (1)
THALLIUM	18	69	0.28	0.06	1.0000		0.6243		N	2.0	0	NO	
TIN	18	56	0.50	0.29	1.0000		0.9858		N	75.9	1	NO	Not a PCOC by P.J. (1)
VANADIUM	18	69	1.00	1.00	0.7931	0.4574	0.9909		N	55.6	0	NO	
ZINC	18	69	1.00	1.00	0.6271	0.8754	0.9707		N	86.7	1	NO	Not a PCOC by P.J. (1)

(1) Professional judgment based on log-normal UTL comparison.

Table A-3
Rocky Flats Plant OU-2
Background Comparison Statistical Test Results of
Surface Soil Metals
(Slippage Test, Quantile Test, Gehan Test, UTL Comparison)
(Concentration Unit: MG/KG)

ANALYTE	N_B	N_S	ND_B	ND_S	DTF_B	DTF_S	MEAN_B	MEAN_S	STD_B	STD_S	UTL99	NGUTL	MAX_B	MAX_S	NGM	P_SLP	NDT20	N_T20	N_SITE	P_QUAN	Z_CAL	Z_95	P_VAL
ALUMINUM	18	69	0	0	1.00	1.00	12886.1	10265.8	2279.9	3310.6	21915.4	0	17950.0	18700.0	1	0.7931	0	18	12	0.9605	-3.380	1.645	0.9996
ANTIMONY(1)	18	50	18	50	0.00	0.00	15.5	18.6	9.8	9.1													
ARSENIC	18	69	0	0	1.00	1.00	5.8	3.8	1.8	1.2	12.9	0	8.5	6.7	0	1.0000	0	18	8	1.0000	-4.251	1.645	1.0000
BARIUM	18	69	0	0	1.00	1.00	194.3	123.6	84.3	32.1	528.0	0	470.0	208.0	0	1.0000	0	19	9	1.0000	-4.504	1.645	1.0000
BERYLLIUM	18	69	9	55	0.50	0.20	1.6	1.5	0.9	1.0	5.2	0	5.0	1.3	0	1.0000	999	999	999	999.0000	-1.443	1.645	0.9254
CADMIUM	17	69	11	59	0.35	0.14	1.4	1.4	0.9	1.0	5.0	0	5.0	2.2	0	1.0000	999	999	999	999.0000	-1.469	1.645	0.9291
CALCIUM	18	69	0	0	1.00	1.00	5022.2	11225.4	2159.2	21802.1	13573.3	12	8810.0	152000.0	16	0.0162	0	18	16	0.2169	0.896	1.645	0.1852
CESIUM	18	51	9	50	0.50	0.02	126.2	197.2	127.4	73.6	630.8	0	500.0	8.7	0	1.0000	999	999	999	999.0000	1.130	1.645	0.1292
CHROMIUM	18	69	0	0	1.00	1.00	15.0	12.0	2.5	4.4	24.8	2	20.2	29.5	2	0.6271	0	18	11	0.9906	-3.432	1.645	0.9997
COBALT	18	69	0	0	1.00	1.00	7.8	6.9	4.3	1.6	24.8	0	24.0	10.2	0	1.0000	0	18	15	0.4574	0.026	1.645	0.4895
COPPER	18	69	0	0	1.00	1.00	13.0	12.9	3.6	2.9	27.3	0	18.5	20.5	2	0.6271	0	18	14	0.7033	-0.252	1.645	0.5993
IRON	18	69	0	0	1.00	1.00	15381.7	13531.0	3226.6	8889.9	28160.4	1	24900.0	81700.0	1	0.7931	0	18	11	0.9906	-3.102	1.645	0.9990
LEAD	18	69	0	0	1.00	1.00	37.5	38.4	6.0	17.7	61.4	3	51.0	145.0	7	0.1846	0	18	16	0.2169	0.073	1.645	0.4707
LITHIUM	18	44	0	4	1.00	0.91	11.0	9.6	2.3	3.8	20.0	2	15.0	22.9	8	0.0524	999	999	999	999.0000	-2.561	1.645	0.9948
MAGNESIUM	18	69	0	0	1.00	1.00	2853.3	2461.6	1049.9	821.0	7011.5	1	5195.0	7030.0	1	0.7931	0	18	12	0.9605	-1.493	1.645	0.9323
MANGANESE	18	69	0	0	1.00	1.00	443.5	303.8	457.0	132.8	2253.5	0	2220.0	1110.0	0	1.0000	0	20	14	0.9275	-2.054	1.645	0.9800
MERCURY(1)	18	44	18	44	0.00	0.00	0.1	0.1	0.0	0.0													
MOLYBDENUM	18	56	17	55	0.06	0.02	14.0	14.4	5.7	5.6	40.0	0	40.0	5.3	7	0.1289	999	999	999	999.0000	1.637	1.645	0.0508
NICKEL	18	69	0	9	1.00	0.87	12.3	10.6	3.7	3.8	26.9	0	18.7	21.6	1	0.7931	0	18	12	0.9605	-1.292	1.645	0.9018
POTASSIUM	18	69	0	0	1.00	1.00	2977.9	2628.1	575.4	739.0	5256.8	0	4205.0	5160.0	3	0.4943	0	18	12	0.9605	-2.405	1.645	0.9919
SELENIUM	18	69	5	50	0.72	0.28	0.6	0.7	0.2	0.3	1.4	0	2.0	1.1	0	1.0000	999	999	999	999.0000	-2.621	1.645	0.9956
SILICON	18	40	1	0	0.94	1.00	780.7	1582.0	701.7	281.8	3559.7	0	1845.0	2160.0	8	0.0401	0	12	11	0.0529	3.875	1.645	0.0001
SILVER	18	64	18	63	0.00	0.02	3.0	3.1	2.1	2.0	10.0	0	10.0	1.2	0	1.0000	999	999	999	999.0000		1.645	0.5000
SODIUM	18	69	9	51	0.50	0.26	305.6	405.5	202.6	182.5	1108.0	0	1000.0	344.0	7	0.1846	999	999	999	999.0000	-0.970	1.645	0.8341
STRONTIUM	18	56	0	0	1.00	1.00	35.3	35.3	13.8	19.2	90.1	2	79.1	100.0	2	0.5702	0	15	12	0.4745	-0.636	1.645	0.7377
THALLIUM	18	69	13	65	0.28	0.06	0.8	1.0	0.3	0.2	2.0	0	2.0	0.5	0	1.0000	999	999	999	999.0000	-0.317	1.645	0.6243
TIN	18	56	9	40	0.50	0.29	31.4	34.6	11.2	15.2	75.9	1	100.0	93.3	0	1.0000	999	999	999	999.0000	-2.192	1.645	0.9858
VANADIUM	18	69	0	0	1.00	1.00	31.6	27.3	6.0	8.0	55.6	0	45.6	51.1	1	0.7931	0	18	15	0.4574	-2.363	1.645	0.9909
ZINC	18	69	0	0	1.00	1.00	55.8	51.7	7.8	9.8	86.7	1	70.6	89.3	2	0.6271	0	18	13	0.8754	-1.891	1.645	0.9707

(1) No detect record from site.

Table A-4
Rocky Flats Plant OU-2
Background Comparison Summary of
Surface Soil Total Radionuclides
(Concentration Unit: pCi/G)

ANALYTE	N_B	N_S	DTF_B	DTF_S	P_SLIP	P_QUAN	P_GEHAN	P_T_1	SIGNIFICT	UTL99	NGUTL	PCOC	REMARK
AMERICIUM-241	15	61	1.00	1.00	0.0001	0.0187	0.0001		Y	0.060	60	YES	
CESIUM-134	0	33	0.00	0.00									NO BKGD measurement
CESIUM-137	12	40	1.00	1.00	1.0000	0.9887	0.9975		N	3.699	0	NO	
GROSS ALPHA	9	34	1.00	1.00	0.1252	0.3146	0.2954		N	42.220	4	YES	
GROSS BETA	18	40	1.00	1.00	0.1436	0.8916	0.4532		N	54.120	0	NO	
PLUTONIUM-239,240	18	72	1.00	1.00	0.0001	0.0109	0.0001		Y	0.133	72	YES	
RADIUM-226	10	40	1.00	1.00	0.0339	0.0825	0.0307		Y	1.585	0	YES	
RADIUM-228	10	13	1.00	1.00	0.3083	0.6632	0.3781		N	4.866	0	NO	
STRONTIUM-89,90	9	29	1.00	1.00	0.0050	0.0878	0.0875		Y	2.217	0	YES	
URANIUM-233,234	13	80	1.00	1.00	0.0121	0.0403	0.0965		Y	1.826	18	YES	
URANIUM-235	13	80	1.00	1.00	0.0403	0.0403	0.0305		Y	0.179	7	YES	
URANIUM-238	13	80	1.00	1.00	0.0020	0.0403	0.0135		Y	2.086	16	YES	

Table A-5
Rocky Flats Plant OU-2
Background Comparison Statistical Test Results of
Surface Soil Radionuclides
(Slippage Test, Quantile Test, Gehan Test, UTL Comparison)
(Concentration Unit: pCi/G)

ANALYTE	N_B	N_S	ND_B	ND_S	DTF_B	DTF_S	MEAN_B	MEAN_S	STD_B	STD_S	UTL99	NGUTL	MAX_B	MAX_S	NGM	P_SLP	N_T20	N_SITE	P_QUAN	Z_CAL	Z_95	P_VAL
AMERICIUM-241	15	61	0	0	1.00	1.00	0.019	9.715	0.010	26.426	0.060	60	0.040	160.000	61	0.0001	16	16	0.0187	5.974	1.645	0.0001
CESIUM-134(1)	0	33	0	0																		
CESIUM-137	12	40	0	0	1.00	1.00	1.418	0.920	0.492	0.467	3.699	0	2.500	2.010	0	1.0000	11	6	0.9887	-2.813	1.645	0.9975
GROSS ALPHA	9	34	0	0	1.00	1.00	20.833	39.607	3.969	61.878	42.220	4	28.000	320.000	8	0.1252	10	9	0.3146	0.538	1.645	0.2954
GROSS BETA	18	40	0	0	1.00	1.00	32.231	33.243	5.527	5.788	54.120	0	40.000	51.100	5	0.1436	12	7	0.8916	0.118	1.645	0.4532
PLUTONIUM-239,240	18	72	0	0	1.00	1.00	0.054	232.529	0.020	1083.880	0.133	72	0.100	7300.000	72	0.0001	18	18	0.0109	6.538	1.645	0.0001
RADIUM-226	10	40	0	0	1.00	1.00	0.946	1.055	0.126	0.176	1.585	0	1.100	1.460	13	0.0339	10	10	0.0825	1.870	1.645	0.0307
RADIUM-228	10	13	0	0	1.00	1.00	2.169	2.276	0.532	0.605	4.866	0	2.900	3.500	2	0.3083	7	4	0.6632	0.311	1.645	0.3781
STRONTIUM-89,90	9	29	0	0	1.00	1.00	0.619	0.925	0.297	0.573	2.217	0	1.000	2.090	15	0.0050	8	8	0.0878	1.356	1.645	0.0875
URANIUM-233,234	13	80	0	0	1.00	1.00	1.167	1.480	0.147	0.635	1.826	18	1.470	3.581	25	0.0121	19	19	0.0403	1.302	1.645	0.0965
URANIUM-235	13	80	0	0	1.00	1.00	0.047	0.089	0.030	0.099	0.179	7	0.100	0.680	19	0.0403	19	19	0.0403	1.873	1.645	0.0305
URANIUM-238	13	80	0	0	1.00	1.00	1.200	1.731	0.198	1.153	2.086	16	1.520	7.740	33	0.0020	19	19	0.0403	2.210	1.645	0.0135

(1) No background measurement.

Table A-6
Rocky Flats Plant OU-2
Background Comparison Summary of
Subsurface Soil Total Metals
(Concentration Unit: MG/KG)

ANALYTE	N_B	N_S	DTF_B	DTF_S	P_SLIP	P_QUAN	P_GEHAN	P_T_1	SIGNIFICT	UTL99	NGUTL	PCOC	REMARK
ALUMINUM	98	300	1.00	1.00	1.0000	0.9738	0.9954	0.9923	N	45083.1	0	NO	
ANTIMONY	66	283	0.18	0.08	0.6571		0.9377		N	47.0	0	NO	
ARSENIC	99	300	0.81	0.94	1.0000	0.0002	0.0001	0.0003	Y	17.0	8	YES	
BARIUM	99	300	0.92	0.83	1.0000	0.9850	0.9966	0.9892	N	371.1	4	YES	
BERYLLIUM	99	300	0.91	0.49	1.0000	1.0000	1.0000		N	18.2	1	NO	Not a PCOC by P.J. (1)
CADMIUM	81	254	0.48	0.34	0.0033		0.6824		Y	2.0	40	YES	
CALCIUM	99	300	0.90	0.99	0.0414	0.0001	0.0001	0.0001	Y	53248.1	56	YES	
CESIUM	95	196	0.78	0.62	1.0000		1.0000		N	1014.9	0	NO	
CHROMIUM	99	300	1.00	0.98	1.0000	0.9993	1.0000	0.9952	N	89.1	1	YES	
COBALT	99	300	0.34	0.52	1.0000		1.0000		N	38.1	1	YES	
COPPER	99	300	0.97	0.86	0.7519	0.9093	0.9987	0.9856	N	49.0	2	YES	
IRON	99	300	1.00	1.00	1.0000	0.9927	1.0000	0.9960	N	52385.2	0	NO	
LEAD	99	300	1.00	1.00	0.4240	1.0000	1.0000	0.9994	N	31.0	3	YES	
LITHIUM	99	192	0.48	0.74	1.0000		1.0000		N	41.9	0	NO	
MAGNESIUM	99	300	0.71	0.96	1.0000	0.7803	0.6168		N	12147.1	1	NO	Not a PCOC by P.J. (1)
MANGANESE	99	298	1.00	1.00	1.0000	0.6504	0.8102	0.7966	N	1194.0	1	YES	
MERCURY	86	294	0.38	0.25	0.5981		1.0000		N	2.1	2	YES	
MOLYBDENUM	99	189	0.18	0.21	0.4299		1.0000		N	67.6	0	NO	
NICKEL	96	298	0.96	0.82	1.0000	1.0000	1.0000	1.0000	N	79.9	0	NO	
POTASSIUM	98	298	0.40	0.70	1.0000		0.9225		N	8362.3	0	NO	
SELENIUM	82	288	0.27	0.04	1.0000		1.0000		N	7.1	0	NO	
SILICON	0	122		0.98									NO BKGD measurement
SILVER	83	283	0.43	0.13	0.5974		1.0000		N	33.1	2	YES	
SODIUM	99	298	0.18	0.50	1.0000		0.9999		N	3680.0	0	NO	
STRONTIUM	99	295	0.43	0.77	1.0000		0.9909		N	269.9	3	NO	Not a PCOC by P.J. (1)
THALLIUM	75	286	0.05	0.16	1.0000		0.9268		N	20.0	0	NO	
TIN	92	194	0.23	0.21	1.0000		0.9999		N	383.7	0	NO	
VANADIUM	99	300	0.98	0.97	1.0000	0.9982	0.9999	0.9956	N	112.8	0	NO	
ZINC	98	300	1.00	1.00	1.0000	0.7934	0.8126	0.8663	N	182.9	2	YES	

(1) Professional judgement based on log-normal-UTL comparison

Table A-7
Rocky Flats Plant OU-2
Background Comparison Statistical Test Results of
Subsurface Soil Metals
(Slippage Test, Quantile Test, Gehan Test, UTL Comparison)
(Concentration Unit: MG/KG)

ANALYTE	N_B	N_S	ND_B	ND_S	DTF_B	DTF_S	MEAN_B	MEAN_S	STD_B	STD_S	UTL99	NGUTL	MAX_B	MAX_S	NGM	P_SLP	N_T20	N_SITE	P_QUAN	Z_CAL	Z_95	P_VAL
ALUMINUM	98	300	0	0	1.00	1.00	12752.0	9857.5	11310.6	4738.2	45083.1	0	102000.0	27900.0	0	1.0000	80	54	0.9738	-2.604	1.645	0.9954
ANTIMONY	66	283	54	261	0.18	0.08	7.0	4.6	5.4	5.6	47.0	0	47.0	26.8	2	0.6571	999	999	999.0000	-1.536	1.645	0.9377
ARSENIC	99	300	19	18	0.81	0.94	4.0	5.8	4.6	4.7	17.0	8	41.8	30.8	0	1.0000	81	73	0.0002	4.730	1.645	0.0001
BARIUM	99	300	8	51	0.92	0.83	97.0	76.0	96.0	71.7	371.1	4	777.0	589.0	0	1.0000	80	53	0.9850	-2.702	1.645	0.9966
BERYLLIUM	99	300	9	154	0.91	0.49	4.8	0.6	4.7	1.4	18.2	1	23.5	22.9	0	1.0000	81	4	1.0000	-14.615	1.645	1.0000
CADMIUM	81	254	42	168	0.48	0.34	0.9	1.0	0.4	1.2	2.0	40	2.4	10.5	20	0.0033	999	999	999.0000	-0.474	1.645	0.6824
CALCIUM	99	300	10	2	0.90	0.99	6995.8	29942.1	16198.9	48753.7	53248.1	56	157000.0	237000.0	11	0.0414	80	77	0.0001	5.627	1.645	0.0001
CESIUM	95	196	21	74	0.78	0.62	230.7	42.4	273.4	61.4	1014.9	0	2830.0	5.1	0	1.0000	999	999	999.0000	-13.784	1.645	1.0000
CHROMIUM	99	300	0	5	1.00	0.98	19.6	12.9	24.3	11.4	89.1	1	176.0	127.0	0	1.0000	81	50	0.9993	-4.897	1.645	1.0000
COBALT	99	300	65	143	0.34	0.52	8.6	4.0	10.3	4.1	38.1	1	93.9	38.5	0	1.0000	999	999	999.0000	-5.023	1.645	1.0000
COPPER	99	300	3	43	0.97	0.86	12.7	10.0	12.7	9.8	49.0	2	123.0	132.0	1	0.7519	80	56	0.9093	-3.005	1.645	0.9987
IRON	99	300	0	0	1.00	1.00	14532.0	10837.1	13257.3	5254.8	52385.2	0	132000.0	40900.0	0	1.0000	80	52	0.9927	-4.364	1.645	1.0000
LEAD	99	300	0	0	1.00	1.00	10.9	8.0	7.0	7.7	31.0	3	39.8	86.4	3	0.4240	80	46	1.0000	-4.353	1.645	1.0000
LITHIUM	99	192	51	49	0.48	0.74	14.7	9.0	9.5	4.4	41.9	0	83.2	32.9	0	1.0000	999	999	999.0000	-6.175	1.645	1.0000
MAGNESIUM	99	300	29	11	0.71	0.96	2706.5	2493.6	3306.4	1296.2	12147.1	1	32500.0	12200.0	0	1.0000	80	58	0.7803	-0.297	1.645	0.6168
MANGANESE	99	298	0	0	1.00	1.00	217.6	192.4	342.0	229.1	1194.0	1	3330.0	3160.0	0	1.0000	81	60	0.6504	-0.879	1.645	0.8102
MERCURY	86	294	53	221	0.38	0.25	0.3	0.5	0.6	6.7	2.1	2	5.9	114.0	2	0.5981	999	999	999.0000	-6.108	1.645	1.0000
MOLYBDENUM	99	189	81	149	0.18	0.21	18.3	16.2	7.6	8.1	67.6	0	67.6	18.7	2	0.4299	999	999	999.0000	-4.083	1.645	1.0000
NICKEL	96	298	4	53	0.96	0.82	20.9	11.7	20.6	7.1	79.9	0	193.0	33.8	0	1.0000	80	40	1.0000	-6.058	1.645	1.0000
POTASSIUM	98	298	59	90	0.40	0.70	1627.4	1181.3	2356.1	933.2	8362.3	0	18700.0	4520.0	0	1.0000	999	999	999.0000	-1.422	1.645	0.9225
SELENIUM	82	288	60	276	0.27	0.04	1.5	0.3	1.9	0.3	7.1	0	13.7	0.5	0	1.0000	999	999	999.0000	-9.126	1.645	1.0000
SILICON(1)	0	122	0	2		0.98		255.2		329.1												
SILVER	83	283	47	247	0.43	0.13	5.8	1.3	9.4	7.0	33.1	2	40.9	96.5	2	0.5974	999	999	999.0000	-9.920	1.645	1.0000
SODIUM	99	298	81	148	0.18	0.50	866.8	208.8	441.1	302.3	3680.0	0	3680.0	1100.0	0	1.0000	999	999	999.0000	-3.764	1.645	0.9999
STRONTIUM	99	295	56	67	0.43	0.77	69.2	44.5	70.3	57.4	269.9	3	484.0	459.0	0	1.0000	999	999	999.0000	-2.361	1.645	0.9909
THALLIUM	75	286	71	239	0.05	0.16	1.3	0.5	1.2	0.5	20.0	0	20.0	0.7	0	1.0000	999	999	999.0000	-1.453	1.645	0.9268
TIN	92	194	71	153	0.23	0.21	66.6	22.8	110.2	10.9	383.7	0	441.0	59.3	0	1.0000	999	999	999.0000	-3.683	1.645	0.9999
VANADIUM	99	300	2	8	0.98	0.97	31.5	23.7	28.5	10.4	112.8	0	283.0	80.4	0	1.0000	81	51	0.9982	-3.847	1.645	0.9999
ZINC	98	300	0	1	1.00	1.00	36.9	31.9	51.1	33.2	182.9	2	486.0	437.0	0	1.0000	80	58	0.7934	-0.888	1.645	0.8126

(1) No background measurement.

Table A-8
Rocky Flats Plant OU-2
Background Comparison t-Test Results of
Subsurface Soil Metals
(Concentration Unit: MG/KG)

ANALYTE	N_B	N_S	ND_B	ND_S	MEAN_B	MEAN_S	STD_B	STD_S	F_CAL	F_TAB	DF_	T_CAL	T_1_95	P_T_1	REMARK
ALUMINUM	98	300	0	0	12752.031	9857.457	11310.572	4738.153	15.3	3.8	108	-2.464	1.661	0.9923	
ANTIMONY	66	283	54	261	7.023	4.633	5.426	5.624							NNDT more than 20%
ARSENIC	99	300	19	18	3.959	5.809	4.574	4.736	5.8	3.8	173	3.459	1.645	0.0003	
BARIUM	99	300	8	51	96.992	76.019	96.016	71.686	0.6	3.8	397	-2.308	1.645	0.9892	
BERYLLIUM	99	300	9	154	4.784	0.580	4.705	1.377							NNDT more than 20%
CADMIUM	81	254	42	168	0.876	1.038	0.372	1.197							NNDT more than 20%
CALCIUM	99	300	10	2	6995.758	29942.080	16198.887	48753.676	66.3	3.8	397	7.057	1.645	0.0001	
CESIUM	95	196	21	74	230.689	42.423	273.395	61.404							NNDT more than 20%
CHROMIUM	99	300	0	5	19.613	12.940	24.327	11.404	6.5	3.8	113	-2.636	1.660	0.9952	
COBALT	99	300	65	143	8.627	4.033	10.326	4.051							NNDT more than 20%
COPPER	99	300	3	43	12.683	9.995	12.728	9.765	0.1	3.8	397	-2.193	1.645	0.9856	
IRON	99	300	0	0	14531.980	10837.127	13257.271	5254.796	6.2	3.8	108	-2.704	1.661	0.9960	
LEAD	99	300	0	0	10.866	8.003	7.049	7.731	3.4	3.8	397	-3.263	1.645	0.9994	
LITHIUM	99	192	51	49	14.711	8.992	9.540	4.399							NNDT more than 20%
MAGNESIUM	99	300	29	11	2706.465	2493.603	3306.385	1296.244							NNDT more than 20%
MANGANESE	99	298	0	0	217.640	192.436	341.962	229.103	0.4	3.8	395	-0.830	1.645	0.7966	
MERCURY	86	294	53	221	0.269	0.476	0.639	6.653							NNDT more than 20%
MOLYBDENUM	99	189	81	149	18.297	16.174	7.627	8.123							NNDT more than 20%
NICKEL	96	298	4	53	20.891	11.652	20.611	7.100	21.6	3.8	102	-4.310	1.662	1.0000	
POTASSIUM	98	298	59	90	1627.439	1181.312	2356.114	933.169							NNDT more than 20%
SELENIUM	82	288	60	276	1.513	0.332	1.911	0.286							NNDT more than 20%
SILICON	0	122	0	2		255.172		329.116							NO BKGD measurement
SILVER	83	283	47	247	5.764	1.291	9.385	6.999							NNDT more than 20%
SODIUM	99	298	81	148	866.828	208.821	441.149	302.260							NNDT more than 20%
STRONTIUM	99	295	56	67	69.173	44.469	70.290	57.403							NNDT more than 20%
THALLIUM	75	286	71	239	1.263	0.539	1.221	0.466							NNDT more than 20%
TIN	92	194	71	153	66.584	22.789	110.153	10.945							NNDT more than 20%
VANADIUM	99	300	2	8	31.493	23.696	28.493	10.371	10.2	3.8	107	-2.665	1.661	0.9956	
ZINC	98	300	0	1	36.895	31.939	51.094	33.174	2.0	3.8	396	-1.111	1.645	0.8663	

Table A-9
Rocky Flats Plant OU-2
Background Comparison Summary of
Subsrface Soil Radionuclides
(Concentration Unit: pCi/G)

ANALYTE	N_B	N_S	DTF_B	DTF_S	P_SLIP	P_QUAN	P_GEHAN	P_T_1	SIGNIFICT	UTL99	NGUTL	PCOC	REMARK
AMERICIUM-241	28	267	1.00	1.00	0.0001	0.0014	0.0001	0.1855	Y	0.022	83	YES	
CESIUM-137	99	205	1.00	1.00	0.0004	0.0005	0.0661	0.0019	Y	0.129	24	YES	
GROSS ALPHA	99	248	1.00	1.00	0.0116	0.7134	0.9902	0.1091	Y	51.423	13	YES	
GROSS BETA	99	281	1.00	1.00	0.7395	0.9953	0.9999	0.9999	N	42.022	1	YES	
PLUTONIUM-239,240	99	284	1.00	1.00		0.0001	0.0001	0.0051	Y	0.025	133	YES	
RADIUM-226	83	139	1.00	1.00	0.0936	0.9974	1.0000	0.9992	N	1.420	4	YES	
RADIUM-228	83	138	1.00	1.00	0.0349	0.5850	0.9281	0.6854	Y	2.330	6	YES	
STRONTIUM-89,90	99	234	1.00	1.00	1.0000	0.2109	0.0001	0.0008	Y	1.054	2	YES	
STRONTIUM-90(1)	0	49	0.00	0.00									
TOTAL RADIOCESIUM(2)	0	0	0.00	0.00									
TRITIUM(3)	99	260	1.00	1.00	0.0050	0.6756	0.9892	0.3281	Y	503.616	13	YES	
URANIUM-233,234	99	272	1.00	1.00	0.2872	0.1702	0.8004	0.2302	N	3.441	4	YES	
URANIUM-235	99	173	1.00	1.00	0.2557	0.2749	0.0001	0.1244	Y	0.153	6	YES	
URANIUM-238	99	279	1.00	1.00	0.4010	0.7905	0.7770	0.2293	N	1.807	6	YES	

(1) No background measurement

(2) No site measeurement

(3) Concentration Unit: pCi/L

Table A-10
Rocky Flats Plant OU-2
Background Comparison Statistical Test Results of
Subsurface Soil Radionuclides
(Slippage Test, Quantile Test, Gehan Test, UTL Comparison)
(Concentration Unit: pCi/G)

ANALYTE	N B	N S	ND B	ND S	DTF B	DTF S	MEAN B	MEAN S	STD B	STD S	UTL99	NGUTL	MAX B	MAX S	NGM	P SLP	N T20	N SITE	P QUAN	Z CAL	Z 95	P VAL
AMERICIUM-241	28	267	0	0	1.00	1.00	-0.002	0.30	0.01	1.80	0.02	83	0.01	22.00	124	0.0001	59	59	0.0014	5.121	1.645	0.0001
CESIUM-137	99	205	0	0	1.00	1.00	0.012	0.11	0.04	0.45	0.13	24	0.20	4.70	19	0.0004	61	52	0.0005	1.505	1.645	0.0661
GROSS ALPHA	99	248	0	0	1.00	1.00	24.915	28.64	9.28	45.17	51.42	13	48.00	480.00	13	0.0116	79	55	0.7134	-2.334	1.645	0.9902
GROSS BETA	99	281	0	0	1.00	1.00	24.717	21.72	6.06	7.68	42.02	1	44.00	56.74	1	0.7395	88	56	0.9953	-3.881	1.645	0.9999
PLUTONIUM-239.240	99	284	0	0	1	1.00	0.004	2.12	0.01	13.82	0.03	133	0.03	180.00	123		79	79	0.0001	7.631	1.645	0.0001
RADIUM-226	83	139	0	0	1.00	1.00	0.746	0.63	0.23	0.28	1.42	4	1.30	1.90	5	0.0936	53	25	0.9974	-4.337	1.645	1.0000
RADIUM-228	83	138	0	0	1.00	1.00	1.402	1.37	0.32	0.63	2.33	6	2.20	6.32	7	0.0349	45	28	0.5850	-1.462	1.645	0.9281
STRONTIUM-89.90	99	234	0	0	1.00	1.00	0.031	0.16	0.36	0.24	1.05	2	1.20	1.10	0	1.0000	68	51	0.2109	4.356	1.645	0.0001
STRONTIUM-90(1)	0	49	0	0																		
TOTAL RADIOCESIUM(1)	0	0	0	0																		
TRITIUM (2)	99	260	0	0	1.00	1.00	141.717	243.41	126.75	2267.36	503.62	13	440.00	36500.00	16	0.0050	76	54	0.6756	-2.297	1.645	0.9892
URANIUM-233.234	99	272	0	0	1	1.00	0.779	1.68	0.93	12.14	3.44	4	8.90	191.70	4	0.2872	78	61	0.1702	-0.843	1.645	0.8004
URANIUM-235	99	173	0	0	1.00	1.00	0.022	0.13	0.05	0.89	0.15	6	0.20	11.50	3	0.2557	59	40	0.2749	7.366	1.645	0.0001
URANIUM-238	99	279	0	0	1.00	1.00	0.733	1.25	0.38	6.96	1.81	6	3.20	113.10	3	0.4010	90	64	0.7905	-0.762	1.645	0.7770

(1) No background measurement

(2) Concentration Unit: pCi/L

Table A-11
Rocky Flats Plant OU-2
Background Comparison t-Test Results of
Subsurface Soil Radionuclides
(Concentration Unit: pCi/G)

ANALYTE	N_B	N_S	ND_B	ND_S	MEAN_B	MEAN_S	STD_B	STD_S	F_CAL	F_TAB	DF_	T_CAL	T_1_95	P_T_1	REMARK
AMERICIUM-241	28	267	0	0	-0.002	0.304	0.007	1.804	2.5	3.8	293	0.896	1.645	0.1855	
CESIUM-137	99	205	0	0	0.012	0.105	0.041	0.451	17.1	3.8	211	2.930	1.645	0.0019	
GROSS ALPHA	99	248	0	0	24.915	28.636	9.284	45.167	5.9	3.8	294	1.234	1.645	0.1091	
GROSS BETA	99	281	0	0	24.717	21.724	6.061	7.679	5.6	3.8	216	-3.927	1.645	0.9999	
PLUTONIUM-239,240	99	284	0	0	0.004	2.123	0.007	13.819	7.8	3.8	283	2.584	1.645	0.0051	
RADIUM-226	83	139	0	0	0.746	0.631	0.231	0.275	0.0	3.9	220	-3.191	1.645	0.9992	
RADIUM-228	83	138	0	0	1.402	1.371	0.318	0.625	6.6	3.9	214	-0.484	1.645	0.6854	
STRONTIUM-89,90	99	234	0	0	0.031	0.158	0.358	0.242	17.4	3.8	137	3.236	1.645	0.0008	
STRONTIUM-90	0	49	0	0		0.127		0.232							NO BKGD measurement
TOTAL RADIOCESIUM	0	0	0	0											NO BKGD measurement
TRITIUM(1)	99	260	0	0	141.717	243.406	126.747	2267.363	1.2	3.8	357	0.446	1.645	0.3281	
URANIUM-233,234	99	272	0	0	0.779	1.682	0.932	12.138	2.0	3.8	369	0.739	1.645	0.2302	
URANIUM-235	99	173	0	0	0.022	0.125	0.046	0.886	2.2	3.8	270	1.156	1.645	0.1244	
URANIUM-238	99	279	0	0	0.733	1.253	0.376	6.955	1.7	3.8	376	0.742	1.645	0.2293	

(1) Concentration Unit: pCi/L

Table A-12
Rocky Flats Plant OU-2
Background Comparison Summary of
UHSU Groundwater Unfiltered Metals
(Concentration Unit: UG/L)

ANALYTE	N_B	N_S	DTF_B	DTF_S	P_SLIP	P_QUAN	P_GEHAN	P_T_1	SIGNIFICT	UTL99	NGUTL	PCOC	REMARK
ALUMINUM	149	323	0.95	0.99	0.0001	0.0001	0.0001	0.0001	Y	25624.6	75	YES	
ANTIMONY	141	304	0.38	0.22	0.0211		0.0034		Y	55.8	23	YES	
ARSENIC	138	296	0.28	0.60	0.0454		0.0001		Y	8.8	12	YES	
BARIUM	149	323	0.74	0.94	0.0001	0.0001	0.0001		Y	300.4	138	YES	
BERYLLIUM	148	318	0.12	0.43	0.0001		0.0001		Y	5.0	38	YES	
CADMIUM	148	302	0.20	0.25	0.0599		0.0037		Y	11.1	7	YES	
CALCIUM	149	323	1.00	1.00	0.0002	0.0001	0.0001	0.0001	Y	145353.0	51	YES	
CESIUM	142	282	0.25	0.02	1.0000		0.6587		N	934.7	0	NO	
CHROMIUM	145	322	0.48	0.77	0.1543	0.0001	0.0001		Y	186.4	19	YES	
COBALT	148	323	0.16	0.61	0.0001		0.0001		Y	50.0	29	YES	
COPPER	148	320	0.74	0.66	0.0001	0.0001	0.0001		Y	45.3	69	YES	
IRON	149	323	0.98	1.00	0.0001	0.0001	0.0001	0.0001	Y	31518.5	72	YES	
LEAD	141	321	0.70	0.93	0.0001	0.0001	0.0001		Y	19.3	97	YES	
LITHIUM	149	322	0.77	0.86	0.2172		0.0001		Y	172.3	8	YES	
MAGNESIUM	149	323	0.97	1.00	0.0001	0.0001	0.0001	0.0001	Y	33005.6	47	YES	
MANGANESE	149	323	0.89	0.99	0.0001	0.0001	0.0001	0.0001	Y	626.4	91	YES	
MERCURY	148	323	0.20	0.13	0.0001		0.9214		Y	0.2	38	YES	
MOLYBDENUM	150	319	0.34	0.25	0.4622		0.0015		Y	195.1	2	YES	
NICKEL	146	323	0.38	0.76	0.0107	0.0001	0.0001		Y	97.5	43	YES	
POTASSIUM	150	323	0.71	0.91	0.0001	0.0001	0.0001		Y	5178.8	142	YES	
SELENIUM	145	305	0.30	0.32	1.0000		0.3264		N	127.5	5	YES	
SILICON	84	218	0.99	1.00	0.0092	0.0001	0.0001	0.0001	Y	61390.0	39	YES	
SILVER	147	310	0.16	0.12	0.1421		0.8207		N	10.0	5	YES	
SODIUM	149	323	0.99	1.00	0.0146	0.0032	0.0001	0.0076	Y	144226.0	19	YES	
STRONTIUM	146	321	0.89	1.00	0.0015	0.0001	0.0001	0.0001	Y	1085.4	39	YES	
THALLIUM	146	323	0.24	0.13	1.0000		0.4057		N	9.0	0	NO	
TIN	149	304	0.35	0.15	0.3012		0.6100		N	179.2	3	YES	
VANADIUM	149	321	0.77	0.83	0.0001		0.0001		Y	68.2	69	YES	
ZINC	149	323	0.91	0.96	0.0003	0.0001	0.0001	0.0001	Y	179.2	56	YES	

Table A-13
Rocky Flats Plant OU-2
Background Comparison Statistical Test Results of
UHSU Groundwater Unfiltered Metals
(Slippage Test, Quantile Test, Gehan Test, UTL Comparison)
(Concentration Unit: UG/L)

ANALYTE	N_B	N_S	ND_B	ND_S	DTF_B	DTF_S	MEAN_B	MEAN_S	STD_B	STD_S	UTL99	NGUTL	MAX_B	MAX_S	NGM	P_SLP	N_T20	N_SITE	P_QUAN	Z_CAL	Z_95	P_VAL
ALUMINUM	149	323	8	4	0.95	0.99	3496.5	32475.9	7758.2	107493.0	25624.6	75	63900.0	1460000.0	30	0.0001	95	93	0.0001	11.085	1.645	0.0001
ANTIMONY	141	304	87	236	0.38	0.22	26.8	34.1	10.2	30.4	55.8	23	86.6	297.0	10	0.0211	999	999	999.0000	2.709	1.645	0.0034
ARSENIC	138	296	99	118	0.28	0.60	3.9	4.0	1.7	2.4	8.8	12	10.0	21.0	8	0.0454	999	999	999.0000	5.477	1.645	0.0001
BARIUM	149	323	39	18	0.74	0.94	105.9	534.1	68.2	1112.1	300.4	138	752.0	11300.0	36	0.0001	95	94	0.0001	13.932	1.645	0.0001
BERYLLIUM	148	318	130	182	0.12	0.43	2.3	4.4	0.6	10.6	5.0	38	5.0	114.0	38	0.0001	999	999	999.0000	4.662	1.645	0.0001
CADMIUM	148	302	119	228	0.20	0.25	2.5	3.7	1.0	7.3	11.1	7	11.1	77.7	7	0.0599	999	999	999.0000	2.679	1.645	0.0037
CALCIUM	149	323	0	0	1.00	1.00	55030.2	123464.9	31667.8	85937.8	145353.1	51	186000.0	700000.0	22	0.0002	97	92	0.0001	13.478	1.645	0.0001
CESIUM	142	282	107	276	0.25	0.02	378.2	428.6	195.1	120.7	934.7	0	1000.0	60.0	0	1.0000	999	999	999.0000	-0.409	1.645	0.6587
CHROMIUM	145	322	75	73	0.48	0.77	13.5	77.9	60.6	301.5	186.4	19	729.0	3360.0	5	0.1543	94	92	0.0001	9.267	1.645	0.0001
COBALT	148	323	124	125	0.16	0.61	21.9	28.4	7.4	62.1	50.0	29	50.0	651.0	29	0.0001	999	999	999.0000	4.044	1.645	0.0001
COPPER	148	320	39	110	0.74	0.66	11.4	55.3	11.9	135.7	45.3	69	105.0	1310.0	37	0.0001	94	89	0.0001	7.532	1.645	0.0001
IRON	149	323	3	1	0.98	1.00	3909.1	42725.9	9680.1	140943.5	31518.5	72	97000.0	1670000.0	28	0.0001	95	92	0.0001	11.770	1.645	0.0001
LEAD	141	321	43	22	0.70	0.93	3.8	29.0	5.4	68.7	19.3	97	52.5	675.0	39	0.0001	94	92	0.0001	10.977	1.645	0.0001
LITHIUM	149	322	34	44	0.77	0.86	34.0	43.0	48.5	67.4	172.3	8	266.0	842.0	4	0.2172	999	999	999.0000	6.110	1.645	0.0001
MAGNESIUM	149	323	4	0	0.97	1.00	10317.4	23753.1	7954.6	25999.7	33005.6	47	47900.0	302000.0	26	0.0001	96	83	0.0001	11.053	1.645	0.0001
MANGANESE	149	323	17	4	0.89	0.99	92.4	852.9	187.2	2149.5	626.4	91	1950.0	24000.0	32	0.0001	95	94	0.0001	11.938	1.645	0.0001
MERCURY	148	323	118	282	0.20	0.13	0.1	0.2	0.0	0.4	0.2	38	0.3	4.7	32	0.0001	999	999	999.0000	-1.414	1.645	0.9214
MOLYBDENUM	150	319	99	240	0.34	0.25	66.0	68.3	45.3	50.3	195.1	2	200.0	389.0	2	0.4622	999	999	999.0000	2.975	1.645	0.0015
NICKEL	146	323	91	79	0.38	0.76	18.7	74.7	27.6	202.7	97.5	43	334.0	2010.0	12	0.0107	94	92	0.0001	8.232	1.645	0.0001
POTASSIUM	150	323	44	30	0.71	0.91	1843.2	7131.1	1169.5	12831.8	5178.8	142	8370.0	181000.0	66	0.0001	95	93	0.0001	12.278	1.645	0.0001
SELENIUM	145	305	101	206	0.30	0.32	8.5	7.6	41.7	25.1	127.5	5	456.0	300.0	0	1.0000	999	999	999.0000	0.450	1.645	0.3264
SILICON	84	218	1	0	0.99	1.00	16575.3	39814.7	15401.0	38005.8	61390.0	39	116000.0	196000.0	14	0.0092	61	57	0.0001	6.859	1.645	0.0001
SILVER	147	310	123	273	0.16	0.12	4.7	4.5	1.0	3.8	10.0	5	10.0	57.0	5	0.1421	999	999	999.0000	-0.918	1.645	0.8207
SODIUM	149	323	2	0	0.99	1.00	30081.9	42065.9	40019.7	65746.2	144226.1	19	194000.0	537000.0	11	0.0146	96	77	0.0032	3.771	1.645	0.0001
STRONTIUM	146	321	16	0	0.89	1.00	312.9	730.5	270.9	574.9	1085.4	39	1770.0	4240.0	17	0.0015	94	81	0.0001	11.784	1.645	0.0001
THALLIUM	146	323	111	282	0.24	0.13	3.9	3.8	1.8	1.8	9.0	0	10.0	5.6	0	1.0000	999	999	999.0000	0.239	1.645	0.4057
TIN	149	304	97	258	0.35	0.15	70.4	83.0	38.2	52.2	179.2	3	200.0	642.0	3	0.3012	999	999	999.0000	-0.279	1.645	0.6100
VANADIUM	149	321	35	53	0.77	0.83	15.1	77.9	18.6	229.1	68.2	69	167.0	3140.0	29	0.0001	999	999	999.0000	10.652	1.645	0.0001
ZINC	149	323	14	14	0.91	0.96	37.1	183.5	49.8	498.4	179.2	56	498.0	5290.0	21	0.0003	95	91	0.0001	10.265	1.645	0.0001

Table A-14
Rocky Flats Plant OU-2
Background Comparison t-Test Results of
UHSU Groundwater Unfiltered Metals
(Concentration Unit: UG/L)

ANALYTE	N_B	N_S	ND_B	ND_S	MEAN_B	MEAN_S	STD_B	STD_S	F_CAL	F_TAB	DF_	T_CAL	T_1_95	P_T_1	REMARK
ALUMINUM	149	323	8	4	3496.5	32475.9	7758.3	107493.0	16.9	3.8	329	4.818	1.645	0.0001	
ANTIMONY	141	304	87	236	26.8	34.1	10.2	30.4							NNDT more than 20%
ARSENIC	138	296	99	118	3.9	4.0	1.7	2.4							NNDT more than 20%
BARIUM	149	323	39	18	105.9	534.1	68.2	1112.1							NNDT more than 20%
BERYLLIUM	148	318	130	182	2.3	4.4	0.6	10.6							NNDT more than 20%
CADMIUM	148	302	119	228	2.5	3.7	1.0	7.3							NNDT more than 20%
CALCIUM	149	323	0	0	55030.2	123464.9	31667.8	85937.8	8.4	3.8	454	12.580	1.645	0.0001	
CESIUM	142	282	107	276	378.2	428.6	195.1	120.7							NNDT more than 20%
CHROMIUM	145	322	75	73	13.5	77.9	60.6	301.5							NNDT more than 20%
COBALT	148	323	124	125	21.9	28.4	7.4	62.1							NNDT more than 20%
COPPER	148	320	39	110	11.4	55.3	11.9	135.7							NNDT more than 20%
IRON	149	323	3	1	3909.1	42725.9	9680.1	140943.5	19.2	3.8	329	4.925	1.645	0.0001	
LEAD	141	321	43	22	3.8	29.0	5.4	68.7							NNDT more than 20%
LITHIUM	149	322	34	44	34.0	43.0	48.5	67.4							NNDT more than 20%
MAGNESIUM	149	323	4	0	10317.5	23753.1	7954.6	25999.7	18.7	3.8	428	8.468	1.645	0.0001	
MANGANESE	149	323	17	4	92.4	852.9	187.2	2149.5	28.8	3.8	332	6.307	1.645	0.0001	
MERCURY	148	323	118	282	0.1	0.2	0.0	0.4							NNDT more than 20%
MOLYBDENUM	150	319	99	240	66.0	68.3	45.3	50.3							NNDT more than 20%
NICKEL	146	323	91	79	18.7	74.7	27.6	202.7							NNDT more than 20%
POTASSIUM	150	323	44	30	1843.2	7131.1	1169.5	12831.8							NNDT more than 20%
SELENIUM	145	305	101	206	8.5	7.6	41.7	25.1							NNDT more than 20%
SILICON	84	218	1	0	16575.3	39814.7	15401.0	38005.8	35.2	3.8	299	7.560	1.645	0.0001	
SILVER	147	310	123	273	4.7	4.5	1.0	3.8							NNDT more than 20%
SODIUM	149	323	2	0	30081.9	42065.9	40019.7	65746.2	6.1	3.8	436	2.440	1.645	0.0076	
STRONTIUM	146	321	16	0	312.9	730.5	270.9	574.9	13.1	3.8	464	10.670	1.645	0.0001	
THALLIUM	146	323	111	282	3.9	3.8	1.8	1.8							NNDT more than 20%
TIN	149	304	97	258	70.4	83.0	38.2	52.2							NNDT more than 20%
VANADIUM	149	321	35	53	15.1	77.9	18.6	229.1							NNDT more than 20%
ZINC	149	323	14	14	37.1	183.5	49.8	498.4	20.5	3.8	336	5.224	1.645	0.0001	

Table A-15
Rocky Flats Plant OU-2
Background Comparison Summary of
UHSU Groundwater Filtered Metals
(Concentration Unit: UG/L)

ANALYTE	N_B	N_S	DTF_B	DTF_S	P_SLIP	P_QUAN	P_GEHAN	P_T_1	SIGNIFICT	UTL99	NGUTL	PCOC	REMARK
ALUMINUM	248	347	0.77	0.43	1.0000		0.2118		N	1816.5	0	NO	
ANTIMONY	248	345	0.48	0.16	0.1962		0.9288		N	51.2	10	YES	
ARSENIC	219	346	0.07	0.10	1.0000		0.9759		N	15.0	0	NO	
BARIUM	256	351	0.71	0.93	0.0001		0.0001		Y	176.5	127	YES	
BERYLLIUM	212	350	0.10	0.03	1.0000		1.0000		N	5.0	0	NO	
CADMIUM	240	345	0.22	0.12	0.3474		0.9938		N	5.1	5	YES	
CALCIUM	257	351	1.00	1.00	0.0068	0.0001	0.0001	0.0001	Y	148383.0	23	YES	
CESIUM	211	300	0.21	0.04	1.0000		0.9986		N	1122.4	0	NO	
CHROMIUM	250	351	0.36	0.21	0.0390		0.9004		Y	15.0	20	YES	
COBALT	231	350	0.18	0.10	1.0000		0.9999		N	50.0	0	NO	
COPPER	250	348	0.39	0.18	1.0000		1.0000		N	53.8	0	NO	
IRON	256	343	0.76	0.39	1.0000		0.6500		N	1682.7	3	YES	
LEAD	250	347	0.23	0.06	1.0000		1.0000		N	15.8	0	NO	
LITHIUM	250	346	0.74	0.71	0.3366		0.1986		N	190.7	3	YES	
MAGNESIUM	254	351	0.94	1.00	0.0001	0.0001	0.0001	0.0001	Y	33721.2	28	YES	
MANGANESE	256	350	0.61	0.73	0.0001	0.0001	0.0001		Y	282.1	69	YES	
MERCURY	206	351	0.10	0.02	1.0000		1.0000		N	0.7	0	NO	
MOLYBDENUM	241	337	0.37	0.25	1.0000		0.0008		Y	188.1	0	YES	
NICKEL	236	346	0.33	0.27	0.0001		0.0001		Y	35.4	24	YES	
POTASSIUM	252	350	0.72	0.88	0.0379		0.0001		Y	4683.9	37	YES	
SELENIUM	219	351	0.32	0.33	1.0000		0.7971		N	136.8	4	YES	
SILICON	0	221		1.00									NO BKGD measurement
SILVER	236	345	0.29	0.07	1.0000		1.0000		N	2586.6	0	NO	
SODIUM	255	351	0.99	1.00	0.0070	0.0001	0.0001	0.0034	Y	156322.0	22	YES	
STRONTIUM	253	351	0.92	1.00	1.0000	0.0001	0.0001	0.0001	Y	1968.2	13	YES	
THALLIUM	213	351	0.22	0.03	1.0000		1.0000		N	72.1	0	NO	
TIN	236	337	0.43	0.08	1.0000		1.0000		N	1734.3	0	NO	
VANADIUM	249	351	0.65	0.34	1.0000		0.9034		N	40.7	0	NO	
ZINC	256	347	0.79	0.40	0.1899		0.9999		N	64.8	5	YES	

Table A-16
Rocky Flats Plant OU-2
Background Comparison Statistical Test Results of
UHSU Groundwater Filtered Metals
(Slippage Test, Quantile Test, Gehan Test, UTL Comparison)
(Concentration Unit: UG/L)

ANALYTE	N_B	N_S	ND_B	ND_S	DTF_B	DTF_S	MEAN_B	MEAN_S	STD_B	STD_S	UTL99	NGUTL	MAX_B	MAX_S	NGM	P_SLP	N_T20	N_SITE	P_QUAN	Z_CAL	Z_95	P_VAL
ALUMINUM	248	347	56	197	0.77	0.43	113.0	73.0	597.3	58.9	1816.5	0	8610.0	856.0	0	1.0000	999	999	999.0000	0.800	1.645	0.2118
ANTIMONY	248	345	128	291	0.48	0.16	24.5	25.7	9.4	10.7	51.2	10	60.0	87.5	3	0.1962	999	999	999.0000	-1.467	1.645	0.9288
ARSENIC	219	346	203	311	0.07	0.10	4.4	3.9	1.6	1.9	15.0	0	15.0	7.6	0	1.0000	999	999	999.0000	-1.976	1.645	0.9759
BARIUM	256	351	73	24	0.71	0.93	87.4	159.2	31.2	76.7	176.5	127	203.0	675.0	74	0.0001	999	999	999.0000	13.689	1.645	0.0001
BERYLLIUM	212	350	190	340	0.10	0.03	2.3	2.1	0.6	0.9	5.0	0	5.0	3.2	0	1.0000	999	999	999.0000	-5.146	1.645	1.0000
CADMIUM	240	345	187	305	0.22	0.12	2.6	2.7	0.9	5.3	5.1	5	8.6	98.2	2	0.3474	999	999	999.0000	-2.499	1.645	0.9938
CALCIUM	257	351	1	0	1.00	1.00	55208.7	106812.5	32667.6	62942.9	148383.2	23	184000.0	678000.0	9	0.0068	124	107	0.0001	14.930	1.645	0.0001
CESIUM	211	300	167	289	0.21	0.04	443.8	423.8	237.9	126.1	1122.4	0	2500.0	120.0	0	1.0000	999	999	999.0000	-2.997	1.645	0.9986
CHROMIUM	250	351	160	278	0.36	0.21	6.0	6.3	3.1	8.6	15.0	20	23.2	82.8	6	0.0390	999	999	999.0000	-1.284	1.645	0.9004
COBALT	231	350	189	314	0.18	0.10	20.9	18.9	8.4	9.9	50.0	0	50.0	13.3	0	1.0000	999	999	999.0000	-3.824	1.645	0.9999
COPPER	250	348	152	285	0.39	0.18	10.7	9.8	15.1	4.8	53.8	0	175.0	20.9	0	1.0000	999	999	999.0000	-4.834	1.645	1.0000
IRON	256	343	62	209	0.76	0.39	93.7	102.5	557.1	252.6	1682.7	3	8790.0	2500.0	0	1.0000	999	999	999.0000	-0.385	1.645	0.6500
LEAD	250	347	192	326	0.23	0.06	2.4	1.5	4.7	1.0	15.8	0	64.0	13.8	0	1.0000	999	999	999.0000	-4.083	1.645	1.0000
LITHIUM	250	346	64	102	0.74	0.71	38.0	32.0	53.6	35.1	190.7	3	250.0	253.0	2	0.3366	999	999	999.0000	0.847	1.645	0.1986
MAGNESIUM	254	351	15	0	0.94	1.00	9991.4	17788.6	8319.8	16107.5	33721.2	28	46300.0	105000.0	18	0.0001	125	90	0.0001	10.195	1.645	0.0001
MANGANESE	256	350	101	95	0.61	0.73	32.7	223.5	87.4	587.1	282.1	69	934.0	4520.0	22	0.0001	122	102	0.0001	7.333	1.645	0.0001
MERCURY	206	351	186	344	0.10	0.02	0.1	0.1	0.1	0.0	0.7	0	0.7	0.3	0	1.0000	999	999	999.0000	-4.023	1.645	1.0000
MOLYBDENUM	241	337	151	253	0.37	0.25	56.1	66.7	46.3	44.0	188.1	0	200.0	44.2	0	1.0000	999	999	999.0000	3.171	1.645	0.0008
NICKEL	236	346	159	251	0.33	0.27	15.4	35.0	7.0	128.8	35.4	24	40.0	1650.0	21	0.0001	999	999	999.0000	4.436	1.645	0.0001
POTASSIUM	252	350	70	43	0.72	0.88	1574.3	2507.8	1090.3	1707.8	4683.9	37	8110.0	11100.0	6	0.0379	999	999	999.0000	10.353	1.645	0.0001
SELENIUM	219	351	149	235	0.32	0.33	9.2	7.6	44.8	23.8	136.8	4	607.0	247.0	0	1.0000	999	999	999.0000	-0.831	1.645	0.7971
SILICON(1)	0	221	0	0		1.00		7308.5		1190.6												
SILVER	236	345	168	320	0.29	0.07	62.5	4.2	885.0	2.0	2586.6	0	13600.0	25.1	0	1.0000	999	999	999.0000	-6.020	1.645	1.0000
SODIUM	255	351	3	1	0.99	1.00	31887.5	44024.8	43627.7	66369.8	156322.3	22	252000.0	497000.0	9	0.0070	122	86	0.0001	4.351	1.645	0.0001
STRONTIUM	253	351	21	0	0.92	1.00	353.8	624.2	566.0	465.9	1968.2	13	7930.0	3210.0	0	1.0000	121	87	0.0001	12.259	1.645	0.0001
THALLIUM	213	351	166	339	0.22	0.03	5.9	4.0	23.2	1.8	72.1	0	328.0	2.1	0	1.0000	999	999	999.0000	-4.800	1.645	1.0000
TIN	236	337	135	309	0.43	0.08	102.3	78.7	572.2	37.5	1734.3	0	8830.0	88.8	0	1.0000	999	999	999.0000	-5.513	1.645	1.0000
VANADIUM	249	351	88	230	0.65	0.34	11.8	14.8	10.1	10.4	40.7	0	50.0	15.2	0	1.0000	999	999	999.0000	-1.301	1.645	0.9034
ZINC	256	347	54	209	0.79	0.40	14.4	14.6	17.7	43.9	64.8	5	137.0	759.0	3	0.1899	999	999	999.0000	-3.687	1.645	0.9999

(1) No background measurement.

Table A-17
Rocky Flats Plant OU-2
Background Comparison t-Test Results of
UHSU Groundwater Filtered Metals
(Concentration Unit: UG/L)

ANALYTE	N_B	N_S	ND_B	ND_S	MEAN_B	MEAN_S	STD_B	STD_S	F_CAL	F_TAB	DF_	T_CAL	T_1_95	P_T_1	REMARK
ALUMINUM	248	347	56	197	113.0	73.0	597.3	58.9							NNDT more than 20%
ANTIMONY	248	345	128	291	24.5	25.7	9.4	10.7							NNDT more than 20%
ARSENIC	219	346	203	311	4.4	3.9	1.6	1.9							NNDT more than 20%
BARIUM	256	351	73	24	87.4	159.2	31.2	76.7							NNDT more than 20%
BERYLLIUM	212	350	190	340	2.3	2.1	0.6	0.9							NNDT more than 20%
CADMIUM	240	345	187	305	2.6	2.7	0.9	5.3							NNDT more than 20%
CALCIUM	257	351	1	0	55208.7	106812.5	32667.6	62942.9	0.9	3.8	606	12.010	1.645	0.0001	
CESIUM	211	300	167	289	443.8	423.8	237.9	126.1							NNDT more than 20%
CHROMIUM	250	351	160	278	6.0	6.3	3.1	8.6							NNDT more than 20%
COBALT	231	350	189	314	20.9	18.9	8.4	9.9							NNDT more than 20%
COPPER	250	348	152	285	10.7	9.8	15.1	4.8							NNDT more than 20%
IRON	256	343	62	209	93.7	102.5	557.1	252.6							NNDT more than 20%
LEAD	250	347	192	326	2.4	1.5	4.7	1.0							NNDT more than 20%
LITHIUM	250	346	64	102	38.0	32.0	53.6	35.1							NNDT more than 20%
MAGNESIUM	254	351	15	0	9991.4	17788.6	8319.8	16107.5	11.2	3.8	552	7.752	1.645	0.0001	
MANGANESE	256	350	101	95	32.7	223.5	87.4	587.1							NNDT more than 20%
MERCURY	206	351	186	344	0.1	0.1	0.1	0.0							NNDT more than 20%
MOLYBDENUM	241	337	151	253	56.1	66.7	46.3	44.0							NNDT more than 20%
NICKEL	236	346	159	251	15.4	35.0	7.0	128.8							NNDT more than 20%
POTASSIUM	252	350	70	43	1574.3	2507.8	1090.3	1707.8							NNDT more than 20%
SELENIUM	219	351	149	235	9.2	7.6	44.8	23.8							NNDT more than 20%
SILICON	0	221	0	0		7308.5		1190.6							NO BKGD measurement
SILVER	236	345	168	320	62.5	4.2	885.0	2.0							NNDT more than 20%
SODIUM	255	351	3	1	31887.5	44024.8	43627.7	66369.8	9.8	3.8	598	2.713	1.645	0.0034	
STRONTIUM	253	351	21	0	353.8	624.2	566.0	465.9	0.2	3.8	602	6.426	1.645	0.0001	
THALLIUM	213	351	166	339	5.9	4.0	23.2	1.8							NNDT more than 20%
TIN	236	337	135	309	102.3	78.7	572.2	37.5							NNDT more than 20%
VANADIUM	249	351	88	230	11.8	14.8	10.1	10.4							NNDT more than 20%
ZINC	256	347	54	209	14.4	14.6	17.7	43.9							NNDT more than 20%

Table A-18
Rocky Flats Plant OU-2
Background Comparison Summary of
UHSU Groundwater Unfiltered Radionuclides
(Concentration Unit: pCi/L)

ANALYTE	N_B	N_S	DTF_B	DTF_S	P_SLIP	P_QUAN	P_GEHAN	P_T_1	SIGNIFICT	UTL99	NGUTL	PCOC	REMARK
AMERICIUM-241	183	275	1.00	1.00	0.0001	0.0001	0.0001	0.0245	Y	0.037	45	YES	
CESIUM-137	156	186	1.00	1.00	0.0862	0.0888	0.7278	0.8051	N	1.065	7	YES	
GROSS ALPHA	23	1	1.00	1.00	1.0000	1.0000	0.4142		N	390.578	0	NO	
GROSS BETA	23	1	1.00	1.00	1.0000	0.2083	0.1097		N	221.307	0	NO	
PLUTONIUM-239,240	194	293	1.00	1.00	0.0001	0.0001	0.0001	0.0268	Y	0.064	65	YES	
RADIUM-226	6	0	0.00	0.00									NO site measurement
STRONTIUM-89,90	32	14	1.00	1.00	0.3043	0.1299	0.0206		Y	1.153	1	YES	
TOTAL RADIOCESIUM	0	6	0.00	0.00									NO BKGD measurement
TRITIUM	84	407	1.00	1.00	1.0000	0.9995	0.7919	0.8482	N	12982.300	0	NO	
URANIUM-233,234	35	3	1.00	1.00	1.0000	1.0000	0.2163		N	144.836	0	NO	
URANIUM-235	35	3	1.00	1.00	1.0000	1.0000	0.7845		N	5.233	0	NO	
URANIUM-238	22	3	1.00	1.00	1.0000	1.0000	0.2516		N	114.171	0	NO	

Table A-19
Rocky Flats Plant OU-2
Background Comparison Statistical Test Results of
UHSU Groundwater Unfiltered Radionuclides
(Slippage Test, Quantile Test, Gehan Test, UTL Comparison)
(Concentration Unit: pCi/l)

ANALYTE	N_B	N_S	ND_B	ND_S	DTF_B	DTF_S	MEAN_B	MEAN_S	STD_B	STD_S	UTL99	NGUTL	MAX_B	MAX_S	NGM	P_SLP	N_T20	N_SITE	P_QUAN	Z_CAL	Z_95	P_VAL
AMERICIUM-241	183	275	0	0	1.0	1.0	0.006	0.429	0.011	3.547	0.037	45	0.097	46.540	28	0.0001	96	84	0.0001	7.201	1.645	0.0001
CESIUM-137	156	186	0	0	1.0	1.0	0.120	0.077	0.331	0.577	1.065	7	1.160	1.799	4	0.0862	69	43	0.0888	-0.606	1.645	0.7278
GROSS ALPHA	23	1	0	0	1.0	1.0	43.497	6.200	94.285		390.578	0	362.000	6.200	0	1.0000	5	0	1.0000	0.217	1.645	0.4142
GROSS BETA	23	1	0	0	1.0	1.0	24.945	20.000	53.342		221.307	0	220.000	20.000	0	1.0000	5	1	0.2083	1.228	1.645	0.1097
PLUTONIUM-239,240	194	293	0	0	1.0	1.0	0.005	2.821	0.021	24.885	0.064	65	0.224	354.600	40	0.0001	99	94	0.0001	13.069	1.645	0.0001
RADIUM-226 (1)	6	0	0	0																		
STRONTIUM-89,90	32	14	0	0	1.0	1.0	0.215	0.412	0.276	0.341	1.153	1	1.120	1.200	1	0.3043	10	5	0.1299	2.041	1.645	0.0206
TOTAL RADIOCESIUM (2)	0	6	0	0																		
TRITIUM(3)	84	407	0	0	1.0	1.0	624.852	145.074	4246.750	260.164	12982.300	0	39030.000	3455.000	0	1.0000	99	71	0.9995	-0.813	1.645	0.7919
URANIUM-233,234	35	3	0	0	1.0	1.0	15.618	4.568	38.753	2.407	144.836	0	164.000	6.408	0	1.0000	8	0	1.0000	0.785	1.645	0.2163
URANIUM-235	35	3	0	0	1.0	1.0	0.617	0.109	1.384	0.149	5.233	0	6.290	0.279	0	1.0000	8	0	1.0000	-0.787	1.645	0.7845
URANIUM-238	22	3	0	0	1.0	1.0	10.840	2.909	27.727	1.750	114.171	0	108.000	4.337	0	1.0000	5	0	1.0000	0.670	1.645	0.2516

(1) No site measurement

(2) No background measurement.

(3) Concentration Unit: pCi/L

Table A-20
Rocky Flats Plant OU-2
Background Comparison t-Test Results of
UHSU Groundwater Unfiltered Radionuclides
(Concentration Unit: pCi/L)

ANALYTE	N_B	N_S	ND_B	ND_S	MEAN_B	MEAN_S	STD_B	STD_S	F_CAL	F_TAB	DF_	T_CAL	T_1_95	P_T_1	REMARK
AMERICIUM-241	183	275	0	0	0.006	0.429	0.011	3.547	9.0	3.8	274	1.977	1.645	0.0245	
CESIUM-137	156	186	0	0	0.120	0.077	0.331	0.577	8.3	3.8	303	-0.861	1.645	0.8051	
GROSS ALPHA	23	1	0	0	43.497	6.200	94.285								records less than 20
GROSS BETA	23	1	0	0	24.945	20.000	53.342								records less than 20
PLUTONIUM-239,240	194	293	0	0	0.005	2.821	0.021	24.885	8.8	3.8	292	1.937	1.645	0.0268	
RADIUM-226	6	0	0	0	0.355		0.128								NO site measurement
STRONTIUM-89,90	32	14	0	0	0.215	0.412	0.276	0.341							records less than 20
TOTAL RADIOCESIUM	0	6	0	0		0.063		0.236							NO BKGD measurement
TRITIUM	84	407	0	0	624.852	145.074	4246.750	260.164	15.5	3.8	83	-1.035	1.666	0.8482	
URANIUM-233,234	35	3	0	0	15.618	4.568	38.753	2.407							records less than 20
URANIUM-235	35	3	0	0	0.617	0.109	1.384	0.149							records less than 20
URANIUM-238	22	3	0	0	10.840	2.909	27.727	1.750							records less than 20

Table A-21
Rocky Flats Plant OU-2
Background Comparison Summary of
UHSU Groundwater Filtered Radionuclides
(Concentration Unit: pCi/L)

ANALYTE	N_B	N_S	DTF_B	DTF_S	P_SLIP	P_QUAN	P_GEHAN	P_T_1	SIGNIFICT	UTL99	NGUTL	PCOC	REMARK
AMERICIUM-241	2	11	1.00	1.00	0.3590	0.5769	0.2149		N	10.068	1	YES	
CESIUM-137	38	13	1.00	1.00	1.0000	0.2851	0.5258		N	2.143	0	NO	
GROSS ALPHA	213	327	1.00	1.00	1.0000	0.0363	0.0001	0.7116	Y	100.523	0	YES	
GROSS BETA	196	345	1.00	1.00	1.0000	0.0001	0.0001	0.0620	Y	39.774	4	YES	
PLUTONIUM-239,240	1	14	1.00	1.00	0.7333	0.8000	0.7573		N	0.011	4	YES	
RADIUM-226	36	132	1.00	1.00	0.0001	0.0001	0.0001	0.0001	Y	0.626	29	YES	
STRONTIUM-89,90	180	284	1.00	1.00	0.3741	0.0195	0.1557	0.0548	Y	1.210	10	YES	
TOTAL RADIOCESIUM	0	77	0.00	0.00									NO BKGD measurement
TRITIUM	165	0	0.00	0.00									NO site measurement
URANIUM-233,234	207	321	1.00	1.00	1.0000	0.0063	0.0001	0.8550	Y	79.470	0	YES	
URANIUM-235	207	321	1.00	1.00	1.0000	0.0063	0.0001	0.6995	Y	2.006	0	YES	
URANIUM-238	177	321	1.00	1.00	1.0000	0.0778	0.0001	0.7026	Y	55.240	1	YES	

Table A-22
Rocky Flats Plant OU-2
Background Comparison Statistical Test Results of
UHSU Groundwater Filtered Radionuclides
(Slippage Test, Quantile Test, Gehan Test, UTL Comparison)
(Concentration Unit: pCi/L)

ANALYTE	N_B	N_S	ND_B	ND_S	DTF_B	DTF_S	MEAN_B	MEAN_S	STD_B	STD_S	UTL99	NGUTL	MAX_B	MAX_S	NGM	P_SLP	N_T20	N_SITE	P_QUAN	Z_CAL	Z_95	P_VAL
AMERICIUM-241	2	11	0	0	1.0	1.0	0.011	1.986	0.011	6.410	10.068	1	0.019	21.310	5	0.3590	3	3	0.5769	0.790	1.645	0.2149
CESIUM-137	38	13	0	0	1.0	1.0	0.420	0.402	0.525	0.448	2.143	0	2.600	1.150	0	1.0000	11	4	0.2851	-0.065	1.645	0.5258
GROSS ALPHA	213	327	0	0	1.0	1.0	8.354	7.087	32.315	8.773	100.523	0	312.700	67.110	0	1.0000	108	74	0.0363	8.344	1.645	0.0001
GROSS BETA	196	345	0	0	1.0	1.0	4.892	6.203	12.230	7.549	39.774	4	135.900	90.000	0	1.0000	109	83	0.0001	7.454	1.645	0.0001
PLUTONIUM-239.240	1	14	0	0	1.0	1.0	0.011	0.078		0.215	0.011	4	0.011	0.813	4	0.7333	3	3	0.8000	-0.697	1.645	0.7573
RADIUM-226	36	132	0	0	1.0	1.0	0.259	0.506	0.111	0.394	0.626	29	0.530	2.822	45	0.0001	34	34	0.0001	5.207	1.645	0.0001
STRONTIUM-89.90	180	284	0	0	1.0	1.0	0.338	0.388	0.306	0.362	1.210	10	1.800	2.200	2	0.3741	93	66	0.0195	1.012	1.645	0.1557
TOTAL RADIOCESIUM(1)	0	77	0	0																		
TRITIUM(2.3)	165	0	0	0																		
URANIUM-233.234	207	321	0	0	1.0	1.0	6.914	5.010	25.439	5.518	79.470	0	199.500	42.620	0	1.0000	106	76	0.0063	9.487	1.645	0.0001
URANIUM-235	207	321	0	0	1.0	1.0	0.195	0.171	0.635	0.220	2.006	0	4.803	1.500	0	1.0000	106	76	0.0063	6.102	1.645	0.0001
URANIUM-238	177	321	0	0	1.0	1.0	4.832	4.096	17.673	6.703	55.240	1	135.600	75.730	0	1.0000	100	71	0.0778	8.577	1.645	0.0001

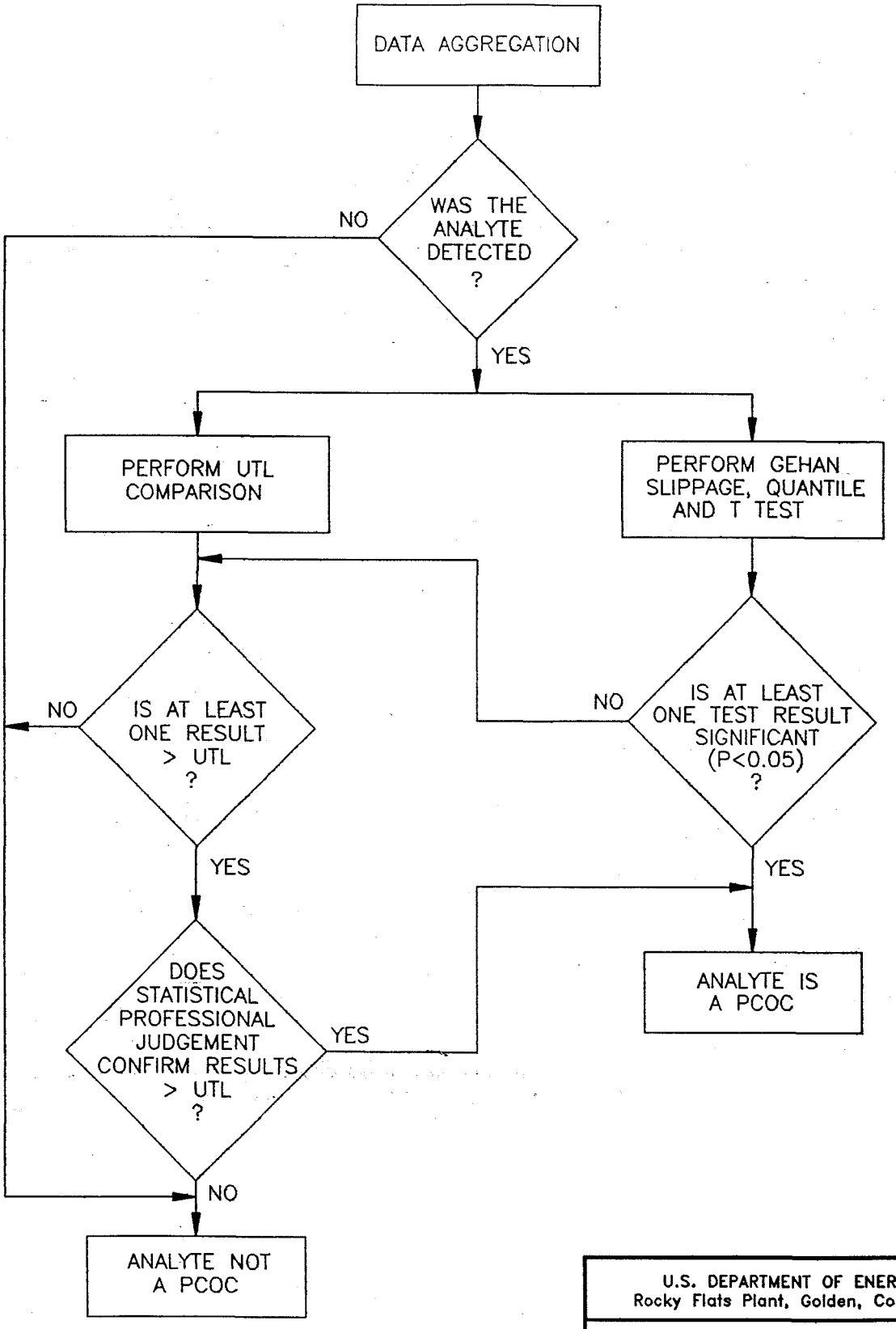
(1) No background measurement

(2) Concentration Unit: pCi/L

(3) No site measurement

Table A-23
Rocky Flats Plant OU-2
Background Comparison t-Test Results of
UHSU Groundwater Filtered Radionuclides
(Concentration Unit: pCi/L)

ANALYTE	N_B	N_S	ND_B	ND_S	MEAN_B	MEAN_S	STD_B	STD_S	F_CAL	F_TAB	DF_	T_CAL	T_1_95	P_T_1	REMARK
AMERICIUM-241	2	11	0	0	0.011	1.986	0.011	6.410							records less than 20
CESIUM-137	38	13	0	0	0.420	0.402	0.525	0.448							records less than 20
GROSS ALPHA	213	327	0	0	8.354	7.087	32.315	8.773	11.0	3.8	232	-0.559	1.645	0.7116	
GROSS BETA	196	345	0	0	4.892	6.203	12.230	7.549	0.5	3.8	539	1.540	1.645	0.0620	
PLUTONIUM-239,240	1	14	0	0	0.011	0.078		0.215							records less than 20
RADIUM-226	36	132	0	0	0.259	0.506	0.111	0.394	7.6	3.9	166	6.345	1.645	0.0001	
STRONTIUM-89,90	180	284	0	0	0.338	0.388	0.306	0.362	5.9	3.8	426	1.603	1.645	0.0548	
TOTAL RADIOCESIUM	0	77	0	0		0.532		0.561							NO BKGD measurement
TRITIUM	165	0	0	0	101.702		180.304								NO site measurement
URANIUM-233,234	207	321	0	0	6.914	5.010	25.439	5.518	22.6	3.8	219	-1.061	1.645	0.8550	
URANIUM-235	207	321	0	0	0.195	0.171	0.635	0.220	11.8	3.8	238	-0.524	1.645	0.6995	
URANIUM-238	177	321	0	0	4.832	4.096	17.673	6.703	11.5	3.8	204	-0.533	1.645	0.7026	



UTL UPPER TOLERANCE LIMIT OF BACKGROUND DATA (99/99)

PCOC POTENTIAL CHEMICAL OF CONCERN

U.S. DEPARTMENT OF ENERGY
Rocky Flats Plant, Golden, Colorado

OPERABLE UNIT NO. 2
TECHNICAL MEMORANDUM NO. 9

BACKGROUND COMPARISON PROCESS

FIGURE A-1 JULY 1994

OU2TM903

APPENDIX B
RISK-BASED EVALUATION OF INFREQUENTLY DETECTED CHEMICALS

APPENDIX B
RISK-BASED EVALUATION OF INFREQUENTLY DETECTED CHEMICALS

B.1 PURPOSE AND APPROACH

The chemicals of concern evaluated in a quantitative human health risk assessment are the subset of all site-related chemicals that are thought to pose the greatest potential risk to human health. The determination that these chemicals may pose the greatest risk is generally based on an evaluation of the following three criteria:

- The inherent toxicity of the chemical
- The concentrations of the chemical found on-site and
- The potential for human exposure to the chemical (e.g., whether or not the chemical is widely distributed across the site or could readily migrate from the site)

In general, compounds found at low frequency (<5% of all samples for a particular media) are not included as chemicals of concern because the potential for human exposure is limited. However, all infrequently detected compounds were evaluated according to the procedures shown in Figure 2-1 so as not to neglect infrequently detected chemicals that could contribute significantly to risk if they were co-located with other potentially hazardous compounds at source areas or locations where routine exposure could occur.

This evaluation examines those metals (detected above background) and organic chemicals that were initially excluded from the chemicals of concern based on low frequency of detection, using a health-based screening approach. A screening evaluation was performed using preliminary remediation goals (PRGs) calculated in guidance provided by DOE (1994). The screening evaluation was performed for all low-frequency chemicals for which PRGs were available. As a benchmark, it was assumed that any infrequently detected chemical whose maximum concentration was greater than 1000 times the PRG warrants further evaluation. The purpose is to identify those infrequently detected chemicals that may pose

an unacceptable health risk (cancer or non-cancer) if chronic exposure were to occur. These chemicals are retained for separated evaluation in the risk assessment. Since they are not characteristic of contamination in OU-2, risk will be assessed separately at the locations where the special case chemicals are found. The media-specific PRG screens are shown in Table B-1 through B-3.

PRGs were calculated assuming a residential exposure scenario, using standard toxicity values (RfDs and SFs) established by EPA, and using the exposure assumptions outlined below (DOE 1994). For surface soils and subsurface soils, multiple pathway exposure was assumed (ingestion and inhalation of particulates) in calculating PRGs. The PRGs for residential soil (surface soil) are used to evaluate both surface and subsurface soil. To calculate PRGs for carcinogens, the target excess lifetime cancer risk is assumed to be 10^{-6} (1 in 1,000,000), the exposure frequency is 350 days/year, exposure duration is 30 years, averaging time is 70 years, the daily inhalation rate is 20 m^3/day, the particulate emission factor (for non-volatile organics and inorganics) is 4.63×10^9 m^3/kg, and the age-adjusted soil ingestion factor is 114 mg-yr/kg-day. All exposure parameters are EPA standard default exposures for adult residents, except for soil ingestion, which is a time-weighted average for child and adult exposures. For PRGs for noncarcinogens, all of the exposure parameters are the same except the averaging time is 30 years and the target hazard index of 1 replaces the target excess lifetime cancer risk.

The PRGs for groundwater also assume a residential scenario, including ingestion and inhalation of volatile organic chemicals released during domestic use. To calculate PRGs for carcinogens, the target excess lifetime cancer risk is 10^{-6} (1 in 1,000,000), body weight is 70 kg, averaging time is 70 years, exposure frequency is 350 days/yr, exposure duration of is 30 years, daily indoor inhalation rate is 15 m^3/day, the volatilization factor (for volatile organic chemicals only) 0.5 L/m^3, and the daily ingestion rate is 2 L/day. All exposure parameters are EPA standard default exposures for adult residents. For PRGs for noncarcinogenic effects, all of the exposure parameters are the same except the averaging time is 30 years and, instead of a target excess lifetime cancer risk, the target hazard index is 1.

B.2 SURFACE SOIL

One pesticide (4,4'-DDT) and one SVOC (di-n-butylphthalate) were detected at low frequency (<5% detection) in surface soil samples. Chromium was detected at a frequency greater than 5%. However, because only two samples had results greater than the background $UTL_{99/99}$, chromium is included in the PRG screen as discussed in Section 3.2. Table B-1 presents a comparison of the maximum detected concentrations to the health-based screening criteria (both cancer and non-cancer). Chemicals whose maximum detected concentration were greater than 1000 times either the cancer or non-cancer PRGS will be retained for further evaluation as special case chemicals of concern. Table B-1 shows that none of the chemicals had concentrations above 1000 times the PRG, and therefore they do not require further evaluation in the risk assessment.

B.3 SUBSURFACE SOIL

Forty VOCs, SVOCs and pesticides/PCBs were reported at less than 5 percent frequency in subsurface soils. As described in Section 4.2, the six metals included in the PRG screen were detected at frequency greater than 5 percent and were within background range according to the formal statistical tests described in Appendix A. However, all had one or two detections greater than the background $UTL_{99/99}$. Only one sample of cobalt had a result above background, but since there is no PRG for this metal, it could not be included in the PRG screen. Table B-4 shows the eight chemicals found in subsurface soil for which there are no PRGs. As shown in Table B-2, none of the chemicals with available PRGs exceeded the screening criteria, therefore they will not require further evaluation in the risk assessment.

B.4 UHSU GROUNDWATER

Table B-3 lists 23 VOCs, SVOCs, and pesticides detected at less than 5 percent frequency in UHSU groundwater. An additional 23 VOCs and SVOCs detected at low frequency do not have PRGs available and are listed on Table B-4. 1,1,1,2-Tetrachloroethane, cis-1,3-dichloropropene, and vinyl chloride were all detected at levels exceeding 1000 times the PRG and will need to be evaluated as special-case chemicals of concern in the risk assessment.

B.5 REFERENCES

Department of Energy (DOE). 1994. Programmatic Preliminary Remediation Goals. Draft Final. Rocky Flats Plant. Golden, Colorado. June 1994.

TABLE B-1
ROCKY FLATS PLANT OU-2
INFREQUENTLY DETECTED COMPOUNDS
COMPARISON TO PRGs
SURFACE SOIL

Chemical	Maximum Detected Conc. (mg/kg)	Residential Soil PRG (mg/kg)	Max. Conc > PRG	Max. Conc. > 1000 x PRG
Organic Compounds:				
4,4'-DDT	0.026	1.88E+00	NO	NO
Di-n-butylphthalate	1.0	2.74E+04	NO	NO
Metals:				
Chromium	29.5	2.74E+05	NO	NO

PRG = Preliminary Remediation Goal (DOE 1994).

TABLE B-2
ROCKY FLATS PLANT OU-2
INFREQUENTLY DETECTED COMPOUNDS
COMPARISON TO PRGs
SUBSURFACE SOIL

Chemical	Maximum Detected Conc. (mg/kg)	Residential Soil PRG (mg/kg)	Max. Conc > PRG?	Max. Conc. > 1000 x PRG?
Organoc Compounds:				
1,1,2,2-Tetrachloroethane	0.005	3.20E+00	NO	NO
1,2-Dichloroethene	0.09	2.47E+03	NO	NO
1,3-Dichloropropene, cis	0.006	3.56E+00	NO	NO
1,4-Dichlorobenzene	0.043	2.67E+01	NO	NO
2-Methylphenol	0.45	1.37E+04	NO	NO
4,4'-DDT	0.14	1.88E+00	NO	NO
4-Methyl-2-pentanone	0.011	1.37E+04	NO	NO
4-Methylphenol	2.9	1.37E+03	NO	NO
Acenaphthene	0.28	1.65E+04	NO	NO
Anthracene	0.26	8.23E+04	NO	NO
Aroclor-1254	8.9	8.32E-02	YES	NO
Benzene	0.012	2.21E+01	NO	NO
Benzo(a)anthracene	0.53	8.77E-01	NO	NO
Benzo(a)pyrene	0.48	8.77E-02	YES	NO
Benzo(b)fluoranthene	0.82	8.77E-01	NO	NO
Benzoic acid	0.4	1.10E+06	NO	NO
Butyl benzylphthalate	0.52	5.49E+04	NO	NO
Carbon disulfide	0.14	2.74E+04	NO	NO
Carbon tetrachloride	140	4.93E+00	YES	NO
Chloroform	8.8	1.05E+02	NO	NO
Chrysene	0.42	8.77E+01	NO	NO
Di-n-octylphthalate	0.26	5.49E+03	NO	NO
Ethylbenzene	0.026	2.74E+04	NO	NO
Fluoranthene	1	1.10E+04	NO	NO
Fluorene	0.19	1.10E+04	NO	NO
Hexachloroethane	1.1	4.57E+01	NO	NO
Indeno(1,2,3-cd)pyrene	0.33	8.77E-01	NO	NO
Naphthalene	2	1.10E+04	NO	NO
Pentachlorophenol	0.095	5.34E+00	NO	NO
Pyrene	1.3	8.23E+03	NO	NO
Styrene	0.017	5.49E+04	NO	NO
Trichloroethene	120	5.82E+01	YES	NO
Total xylenes	0.23	5.49E+05	NO	NO
Metals:				
Chromium	127	2.74E+05	NO	NO
Manganese	3160	1.37E+03	YES	NO
Mercury	114	8.23E+01	YES	NO
Silver	96.5	1.37E+03	NO	NO
Zinc	437	8.23E+04	NO	NO

PRG = Preliminary Remediation Goal (DOE 1994).

TABLE B-3
ROCKY FLATS PLANT OU-2
INFREQUENTLY DETECTED COMPOUNDS
COMPARISON TO PRGs
UHSU GROUNDWATER

Chemical	Maximum Detected Conc. (mg/l)	Residential Groundwater PRG (mg/l)	Max. Conc > PRG?	Max. Conc. > 1000 x PRG?
1,1,2,2-Tetrachloroethane	0.18	8.95E-05	YES	YES
1,1,2-Trichloroethane	0.021	3.18E-04	YES	NO
1,2,4-Trichlorobenzene	0.002	2.34E-02	NO	NO
1,2-Dichloroethane	0.006	1.97E-04	YES	NO
1,2-Dichloropropane	0.001	1.25E-03	NO	NO
1,3-Dichloropropene, cis	1.6	1.27E-04	YES	YES
1,3-Dichloropropene, trans	0.008	1.27E-04	YES	NO
1,4-Dichlorobenzene	0.0003	3.54E-03	NO	NO
4-Methyl-2-pentanone	0.01	1.98E-01	NO	NO
Benzoic acid	0.056	1.46E+02	NO	NO
Bromoform	0.006	3.81E-03	YES	NO
Bromomethane	0.001	1.09E-02	NO	NO
Carbon disulfide	0.0005	2.76E-02	NO	NO
Chlorobenzene	0.016	5.16E-02	NO	NO
Chloroethane	0.002	2.78E+01	NO	NO
Chloromethane	0.32	2.32E-03	YES	NO
Di-n-butylphthalate	0.003	3.65E+00	NO	NO
Dibromochloromethane	0.002	1.01E-03	YES	NO
Ethylbenzene	0.015	1.58E+00	NO	NO
Heptachlor epoxide	0.00007	9.34E-06	YES	NO
Styrene	0.014	2.01E+00	NO	NO
Total xylenes	0.053	7.30E+01	NO	NO
Vinyl chloride	0.86	2.81E-05	YES	YES

PRG = Preliminary Remediation Goal (DOE 1994).

TABLE B-4
ROCKY FLATS PLANT OU-2
INFREQUENTLY DETECTED COMPOUNDS
WITHOUT PRGs

Subsurface Soil
Benzo(ghi)perylene
Chloroethane
2-Chloroethyl vinyl ether
Cobalt
Hexachlorobutadiene
2-Methylnaphthalene
4-Nitroaniline
Phenanthrene
Groundwater
1,1,1,2-Tetrachloroethane
1,2,3-Trichlorobenzene
1,2,3-Trichloropropane
1,2,4-Trimethylbenzene
1,2-Dibromo-3-chloropropane
1,2-Dibromoethane
1,1-Dichloropropene
1,3-Dichlorobenzene
1,3-Dichloropropane
1,3,5-Trimethylbenzene
2-Hexanone
Bromobenzene
Bromochloromethane
Dibromomethane
Dichlorodifluoromethane
Hexachlorobutadiene
n-Butylbenzene
o-Chlorotoluene
p-Chlorotoluene
p-Cymene
sec-Butylbenzene
tert-Butylbenzene
Trichlorofluoromethane

PRG = Preliminary Remediation Goal (DOE 1994).

APPENDIX C
EVALUATION OF MANGANESE AND ANTIMONY IN UHSU GROUNDWATER

APPENDIX C
EVALUATION OF MANGANESE AND ANTIMONY IN UHSU GROUNDWATER

This appendix describes professional judgements used in interpreting the results of the statistical background comparisons for manganese and antimony in UHSU groundwater. Both of these metals exceeded statistical background limits for UHSU groundwater based on the statistical tests described in Appendix A. However, further assessment of these metals indicates that they are not related to contamination in OU-2. The rationale for this conclusion is provided below.

C.1 MANGANESE

Based on the statistical tests described in Appendix A, manganese concentrations in both filtered and unfiltered OU-2 UHSU groundwater samples are significantly higher than background groundwater concentrations. The elevated manganese concentrations in OU-2 groundwater sample may be attributable to one or more of the following mechanisms:

- Direct release of manganese to the subsurface environment from historic RFP operations.
- Enhanced dissolution of naturally occurring manganese from geologic materials in volatile organic carbon (VOC) contaminant plume areas related to historic RFP operations (indirect release).
- Spatial variability in concentrations of naturally occurring manganese.

Evaluations involving professional judgement were performed to assess the occurrence and distribution of elevated manganese concentrations in UHSU groundwater relative to these potential mechanisms. These evaluations included assessment of historical releases in OU-2, the spatial distribution of elevated manganese concentrations in UHSU groundwater, and geochemical analysis of manganese relative to naturally occurring conditions in the foothills regions in Colorado.

C.1.1 Historical Releases of Manganese at RFP

Based on information in the Historical Release Report (DOE 1992), there are no records or reports of manganese use in any RFP processes, or of its disposal or storage at OU-2. Therefore, the presence of manganese as a waste constituent is unlikely.

C.1.2 Spatial Distribution of Elevated Manganese Concentrations in UHSU Groundwater

The spatial distribution of manganese in UHSU groundwater was assessed to determine if there were any apparent trends that could be attributable either to direct release of manganese to the subsurface environment or to enhanced dissolution of naturally occurring manganese in VOC plume areas. Figures C-1 and 5-2a show the elevated manganese concentrations in filtered and unfiltered samples, respectively, in UHSU groundwater in OU-2.

If the elevated manganese concentrations were the result of direct release of manganese from source areas (e.g., burial trenches), it is expected that manganese concentrations would exhibit a decreasing trend at increasing distance from apparent source areas. Based on the data presented on Figures C-1 and 5-2a, no such trends or source areas are apparent. Elevated concentrations occur over a wide area, with no apparent concentration gradients. They are present both near and distant from known contaminant source areas, even occurring near Indiana Avenue (wells 41591 and 41691). This distribution suggests that, in general, the elevated concentrations are not related to direct releases of manganese to the UHSU groundwater.

Elevated VOC concentrations in groundwater may result in reduced redox conditions, which can result in dissolution of naturally occurring manganese from geologic materials, thus elevating manganese concentrations in groundwater. Under such conditions, the elevated manganese concentration locations would correlate with VOC plumes. Figures C-2 through C-6 are scatter plots depicting manganese concentrations in filtered samples versus concentrations of PCE, TCE, carbon tetrachloride, chloroform, and 1,1-DCE. Review of the analytical results from each well (data not shown) and the scatter plots indicates that there is no correlation between manganese and VOC concentrations in samples from the wells completed within VOC plumes, nor in samples from wells completed outside the plume.

(Well identifications are not shown on the scatter plots because they cannot be readily displayed.) Also, the highest concentrations of manganese occur in three wells, 3586, 6691, and 13091, two of which (3586 and 13091) are completed in areas where no detectable concentrations of VOCs occur. Therefore, it appears that the elevated manganese concentrations are not attributable to enhanced dissolution of manganese in the presence of elevated VOCs.

Recent site-wide studies by EG&G (1994) of unfiltered UHSU groundwater samples indicate that elevated concentrations as high as 1,000 µg/L occur over a wide area of the plant site, both upgradient and downgradient of industrial areas and contaminant sources. These studies also concluded that none of the background wells used to establish the background concentrations in the 1993 Background Characterization Report (DOE 1993) are located in the areas of high manganese concentrations recently identified in background areas of the site. Therefore, the OU-2 manganese concentrations that exceed background limits based on the data in the 1993 report may be representative of background concentrations if new background data from high manganese areas are considered.

C.1.3 Geochemical Analysis

Naturally occurring manganese concentrations are relatively high in the foothill regions of the Colorado Rocky Mountains, and the distribution of manganese is highly variable depending on redox conditions. As discussed by Hem (1989), both manganese and iron precipitate due to redox processes in a weathered environment, such as in the UHSU at Rocky Flats. In general, manganese is co-precipitated with iron and, under some conditions, cobalt, lead, zinc, copper, nickel, and barium. Figure C-7, which shows iron versus manganese concentrations for OU-2 unfiltered UHSU groundwater samples, indicates a high correlation between manganese and iron concentrations. This indicates that the occurrence of high concentrations of manganese in unfiltered OU-2 samples is associated with high levels of iron, as occurs under natural conditions. This process may also explain the elevated concentrations in OU-2 of the other metal ions mentioned by Hem: cobalt, lead, nickel, zinc, copper, and barium.

C.2 ANTIMONY

Some of the formal statistical background comparison tests (Slippage and Gehan tests), as well as the UTL comparison, suggest that antimony concentrations in unfiltered OU-2 UHSU groundwater samples are significantly higher than background concentrations (see Appendix A). In filtered samples, antimony was within background levels according to the formal statistical tests, but 10 results exceeded the background $UTL_{99/99}$ of 51.2 µg/L.

However, the results of the statistical tests and UTL comparison are suspect because the results for antimony are highly dependent on the replacement values specified for non-detects (i.e., half the reporting limit). The detection frequencies in both background and OU-2 samples are low. In background samples, the detection frequencies were 38 percent (unfiltered) and 48 percent (filtered). In OU-2 samples, detection frequencies were even lower: 22 percent (unfiltered) and 16 percent (filtered). As a result, a large number of replacement values for non-detects occur in the data sets used in the background comparison, especially in the OU-2 data set (see histograms in Figures C-8 and C-9). Because of the high number of non-detects, the background UTL may not be representative of background concentrations, and statistical tests, such as the Gehan test, that rely on ranking of data, do not provide a reliable basis for testing differences in antimony concentrations detected in background samples and in OU-2 samples. In other words, the results of the statistical tests and UTL comparison shown in Appendix A for antimony in UHSU groundwater do not support strong conclusions about differences from background.

The temporal distribution of elevated antimony results was also assessed. The concentrations in filtered samples from ten wells where concentrations exceeded the background UTL (51.2 µg/L) were plotted as a time series from first quarter 1991 to fourth quarter 1992 (Figure C-10). For all the wells, the measured concentrations exceeded the background UTL only once during the sampling period. For seven of the wells, this occurred during the fourth quarter 1991 sampling event. For the other well (0286), this occurred during the second quarter 1991 sampling event.

For unfiltered sample results, data from the ten wells with the highest concentrations above background UTL (55.8 µg/L) were plotted (Figure C-11). As for the filtered results, the concentrations measured in unfiltered samples from each well exceeded the background UTL

only once during the sampling period. As with most of the filtered results, this occurred during the fourth quarter 1991 sampling event. Therefore, the elevated antimony results in filtered and unfiltered samples are temporally isolated and not characteristic of USHU groundwater over time.

Isolated temporal patterns in groundwater quality samples analyzed for metals may be related to sampling procedures (Plus and Powell 1992). This is because turbidity resulting from bailing or excessive pumping can substantially increase the concentration of some metals, such as antimony and arsenic. The isolated occurrence of the elevated results, followed by subsequent sampling rounds in which concentrations are much lower, is not expected in a groundwater system and is indicative of a sampling artifact. Given that nearly all the high antimony results were observed during the same single sampling event, it is likely that the single high detections were related to sampling procedures used during the fourth quarter 1991 event, and are not representative of natural groundwater concentrations.

C.3 REFERENCES

EG&G. 1994. Groundwater Geochemistry Report, Rocky Flats Plant. (in preparation, due December 20, 1994).

Hem, J.D. 1989. Study and Interpretation of the Chemical Characteristics of Natural Water. USGS Water-Supply Paper 2254.

Plus, R.W. and Powell, R.M. 1992. Acquisition of Representative Groundwater Quality Samples for Metals. Groundwater Monitoring Review, Summer 1992.

U.S. Department of Energy (DOE). 1992. Final Historical Release Report for the Rocky Flats Plant USDOE. Department of Energy, Golden, Colorado. ER Program. June.

U.S. Department of Energy (DOE). 1993. Background Geochemical Characterization Report, Rocky Flats Plant. U.S. DOE, Rocky Flats Plants, Golden, Colorado. September 30.

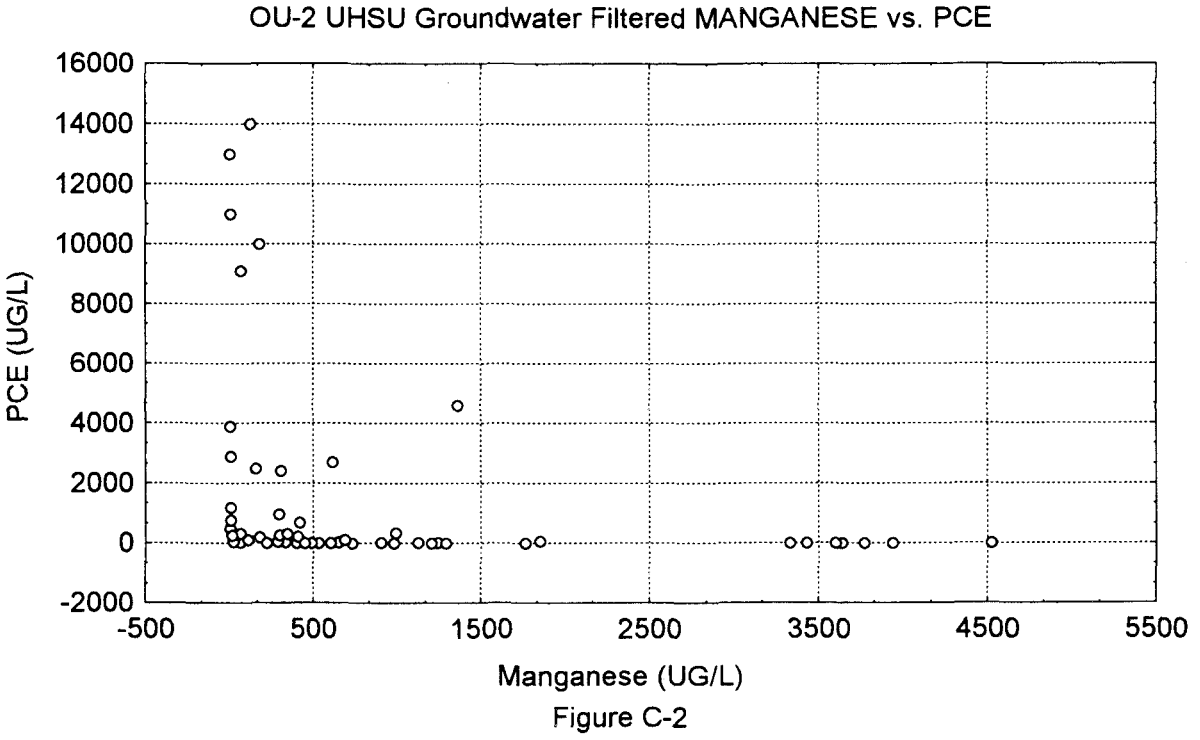

OU-2 UHSU Groundwater Filtered MANGANESE vs. PCE
16000
14000
12000
10000
8000
6000
4000
2000
0
-2000
PCE (UG/L)
-500
500
1500
2500
3500
4500
5500
Manganese (UG/L)

Figure C-2

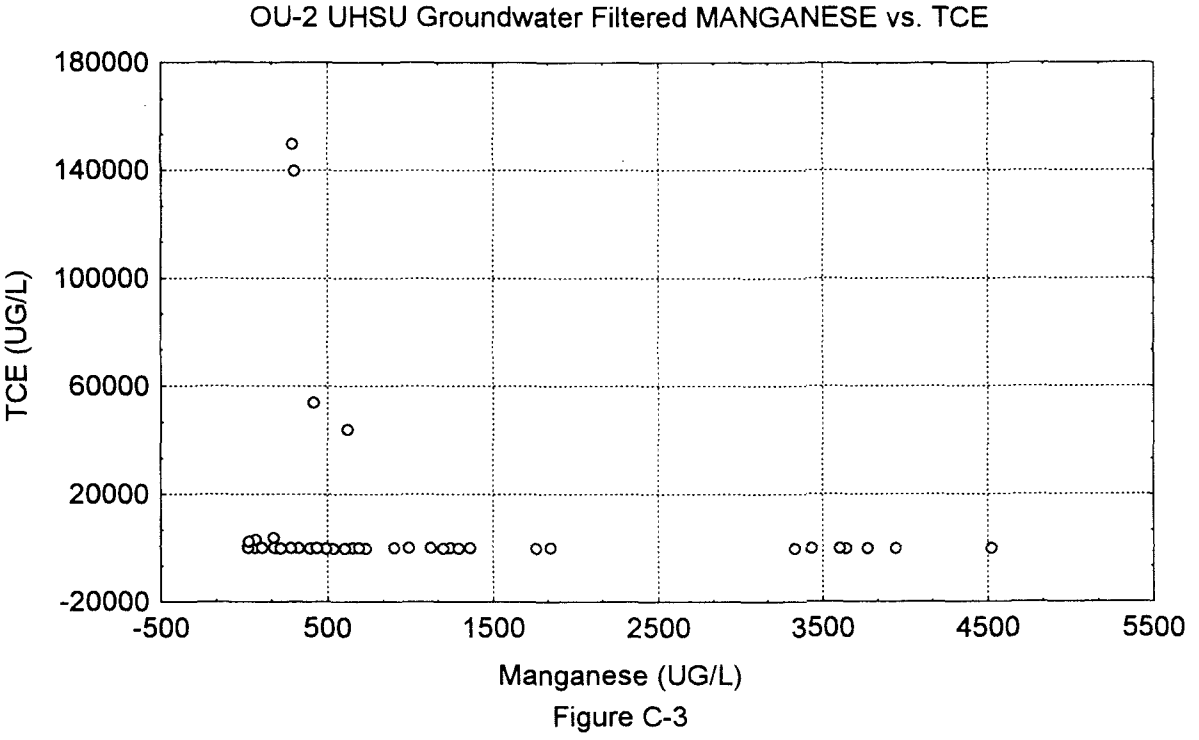

OU-2 UHSU Groundwater Filtered MANGANESE vs. TCE
180000
140000
100000
60000
20000
-20000
TCE (UG/L)
-500
500
1500
2500
3500
4500
5500
Manganese (UG/L)

Figure C-3

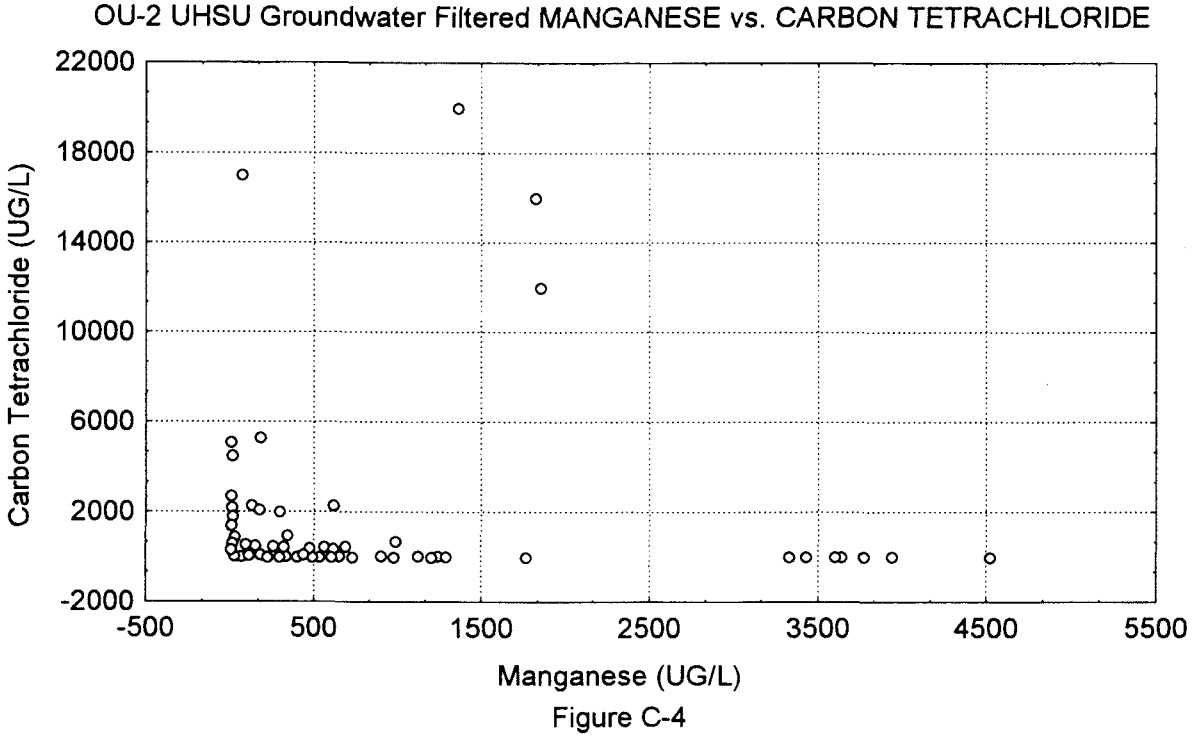

OU-2 UHSU Groundwater Filtered MANGANESE vs. CARBON TETRACHLORIDE
Carbon Tetrachloride (UG/L)
22000
18000
14000
10000
6000
2000
-2000
-500
500
1500
2500
3500
4500
5500
Manganese (UG/L)

Figure C-4

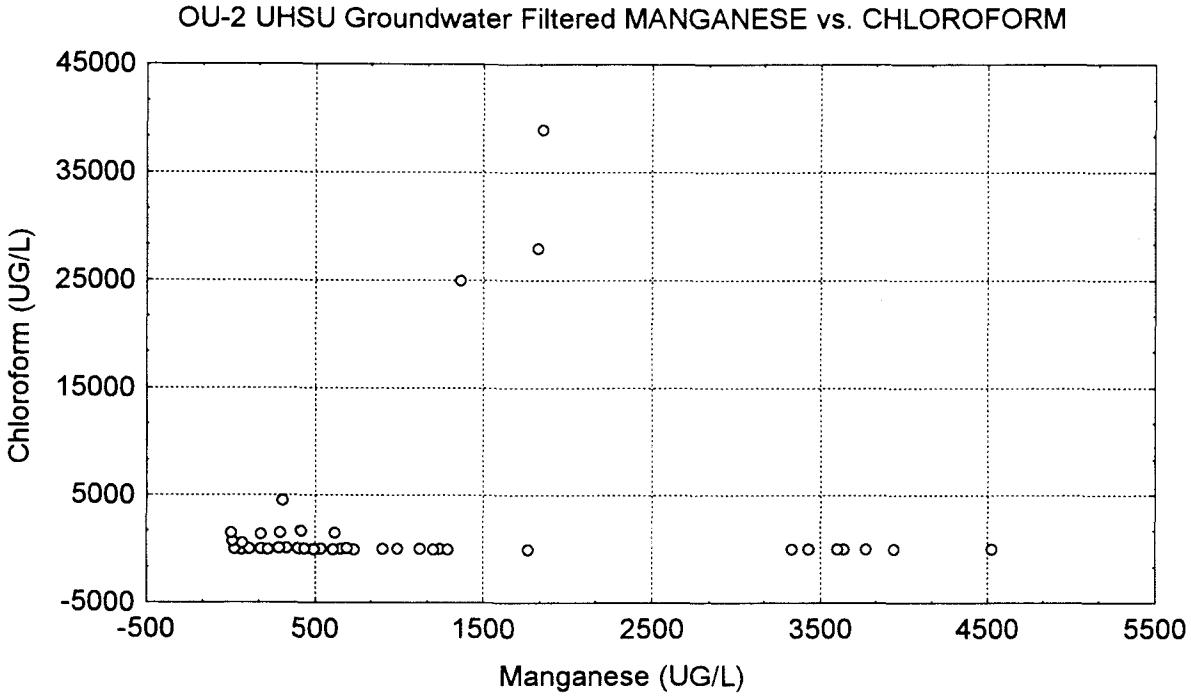

OU-2 UHSU Groundwater Filtered MANGANESE vs. CHLOROFORM
45000
35000
25000
15000
5000
-5000
Chloroform (UG/L)
-500
500
1500
2500
3500
4500
5500
Manganese (UG/L)

Figure C-5

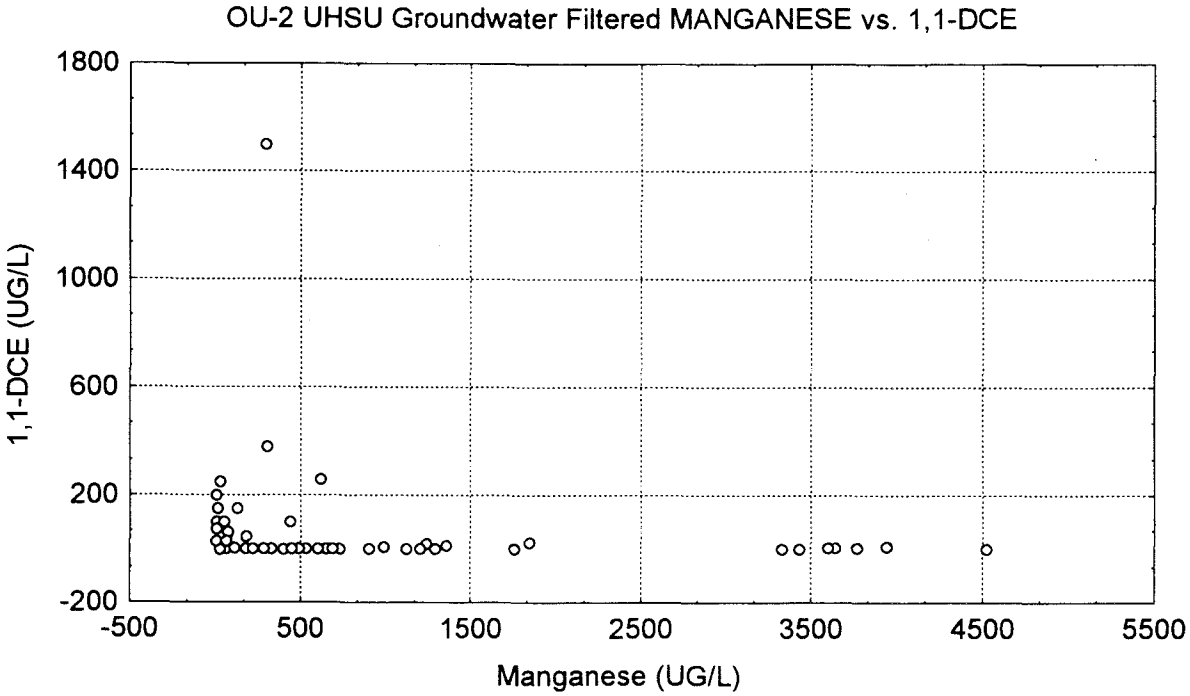

OU-2 UHSU Groundwater Filtered MANGANESE vs. 1,1-DCE
1800
1400
1000
600
200
-200
1,1-DCE (UG/L)
-500
500
1500
2500
3500
4500
5500
Manganese (UG/L)

Figure C-6

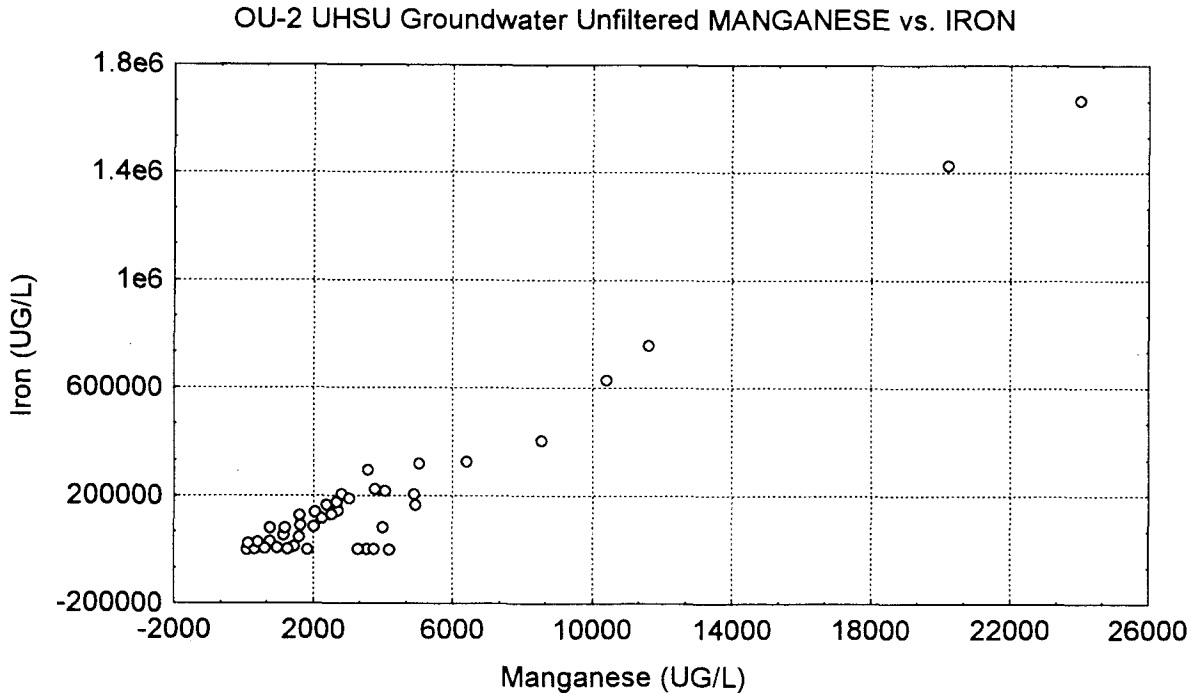
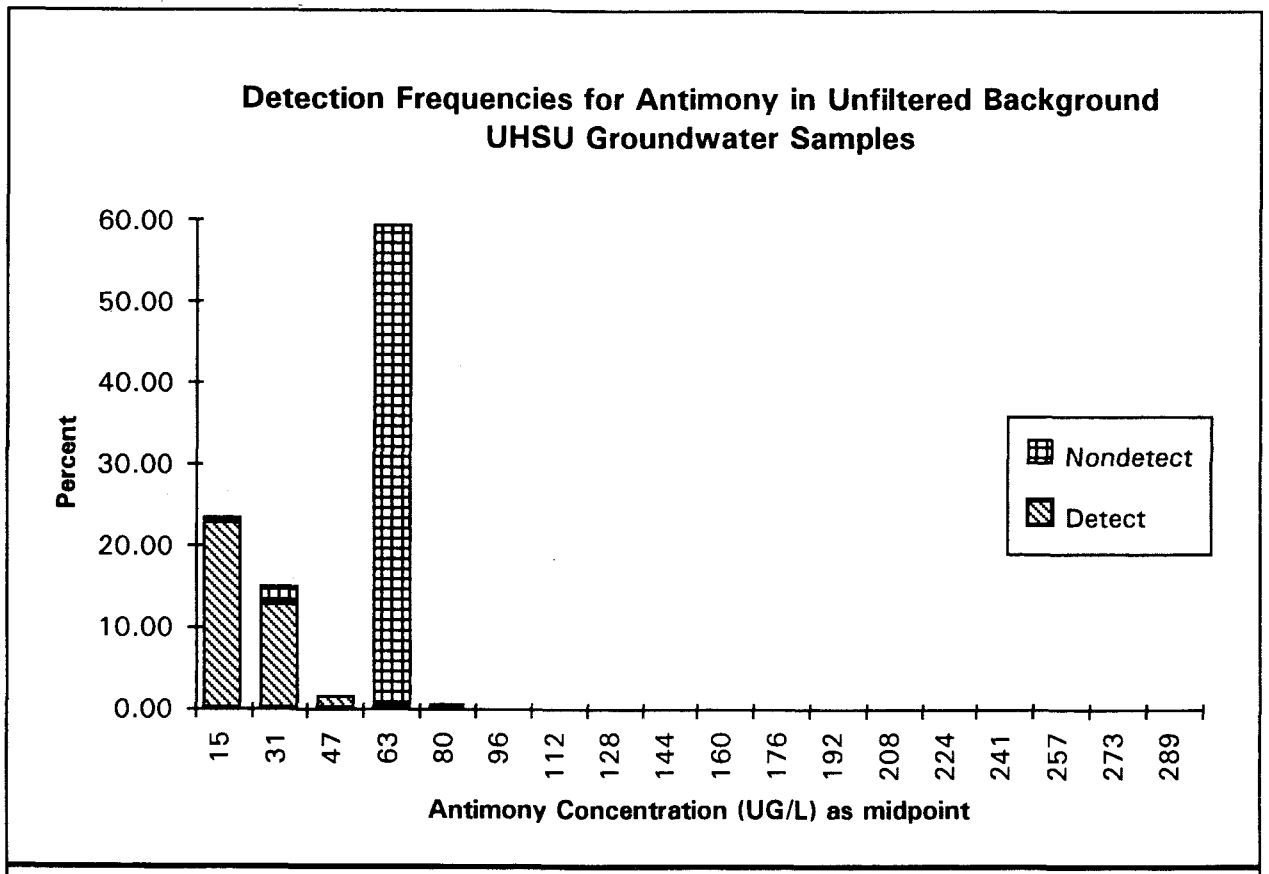

OU-2 UHSU Groundwater Unfiltered MANGANESE vs. IRON
1.8e6
1.4e6
1e6
600000
200000
-200000
Iron (UG/L)
-2000
2000
6000
10000
14000
18000
22000
26000
Manganese (UG/L)

Figure C-7


Detection Frequencies for Antimony in Unfiltered Background UHSU Groundwater Samples
60.00
50.00
40.00
30.00
20.00
10.00
0.00
Percent
Nondetect
Detect
15
31
47
63
80
96
112
128
144
160
176
192
208
224
241
257
273
289
Antimony Concentration (UG/L) as midpoint

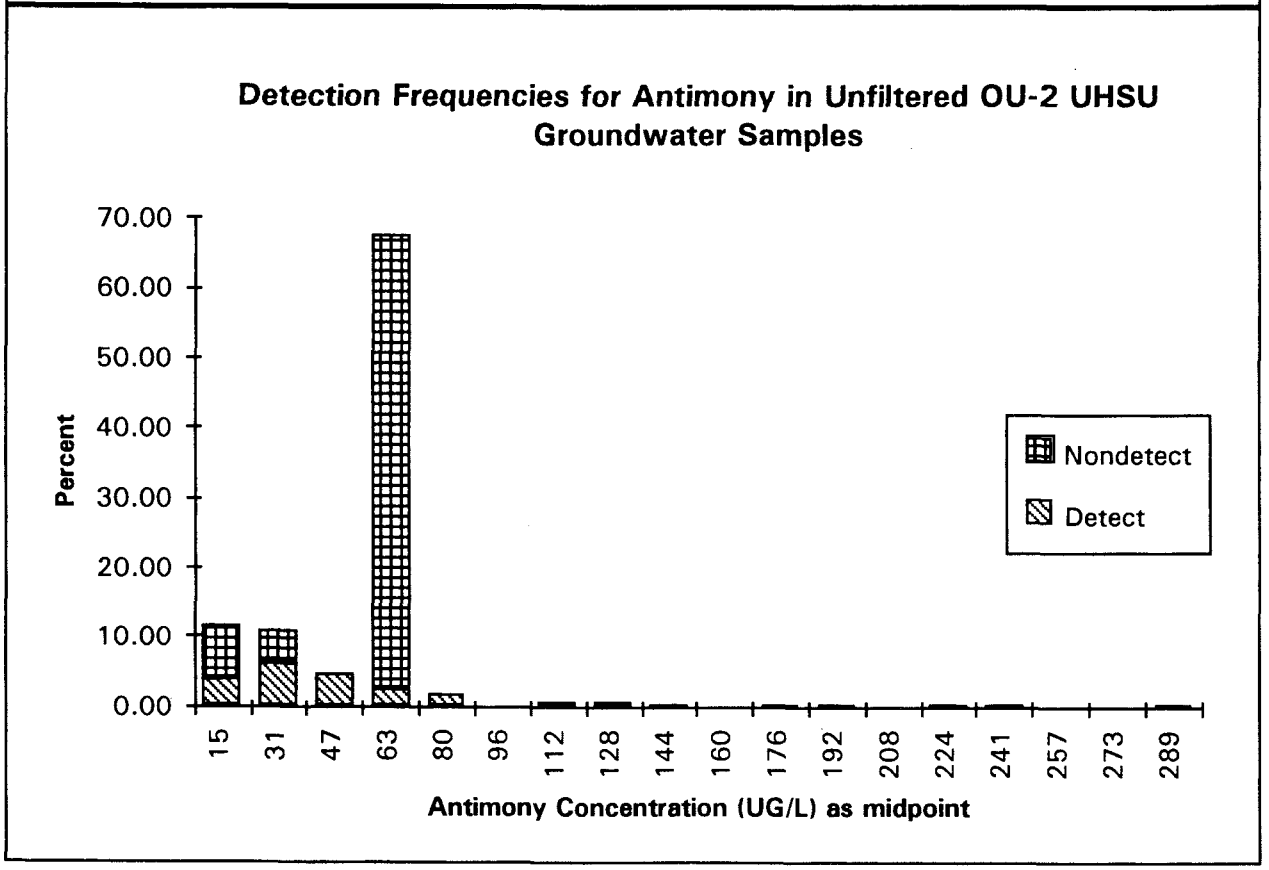
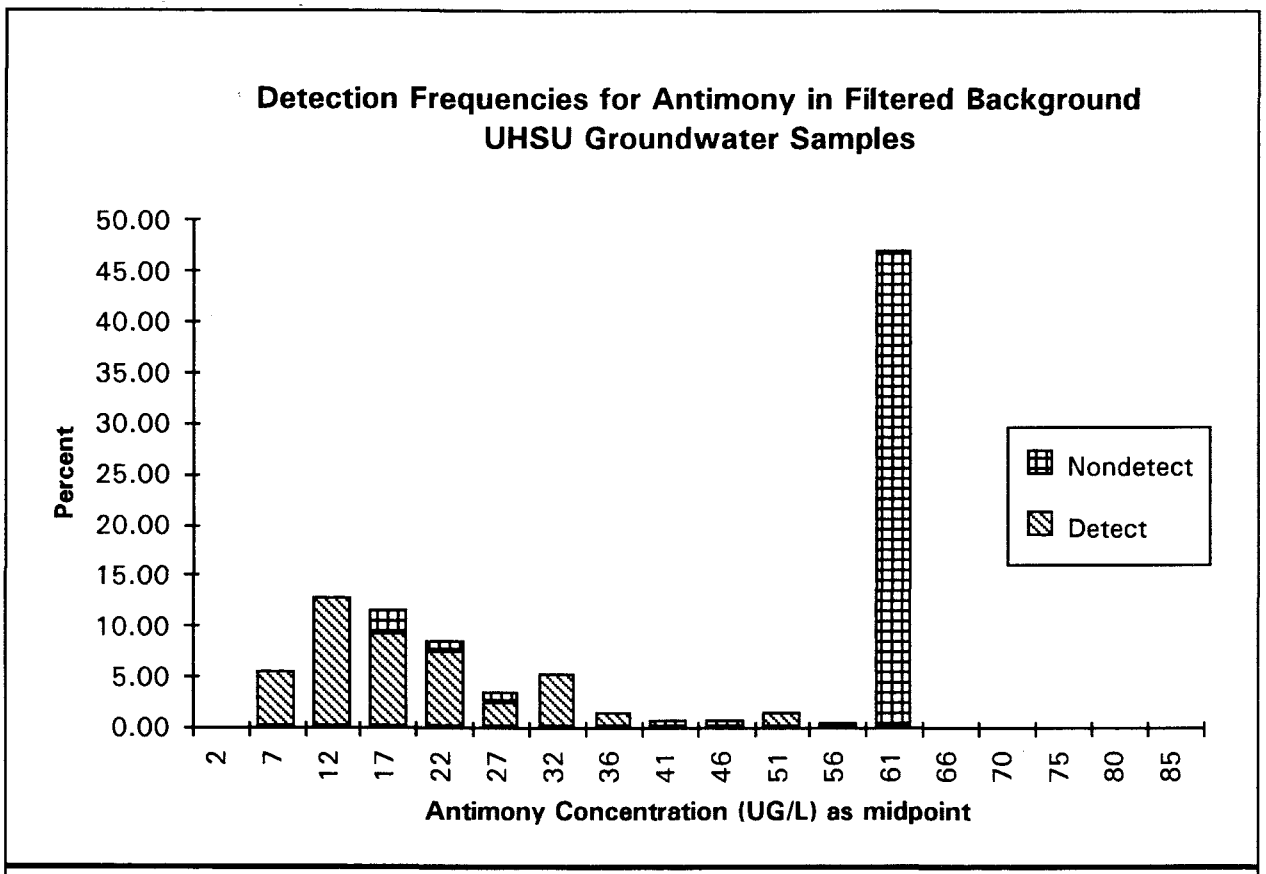

Detection Frequencies for Antimony in Unfiltered OU-2 UHSU Groundwater Samples
70.00
60.00
50.00
40.00
30.00
20.00
10.00
0.00
Percent
Nondetect
Detect
15
31
47
63
80
96
112
128
144
160
176
192
208
224
241
257
273
289
Antimony Concentration (UG/L) as midpoint

Figure C-8


Detection Frequencies for Antimony in Filtered Background
UHSU Groundwater Samples
Percent
50.00
45.00
40.00
35.00
30.00
25.00
20.00
15.00
10.00
5.00
0.00
2
7
12
17
22
27
32
36
41
46
51
56
61
66
70
75
80
85
Antimony Concentration (UG/L) as midpoint
Nondetect
Detect

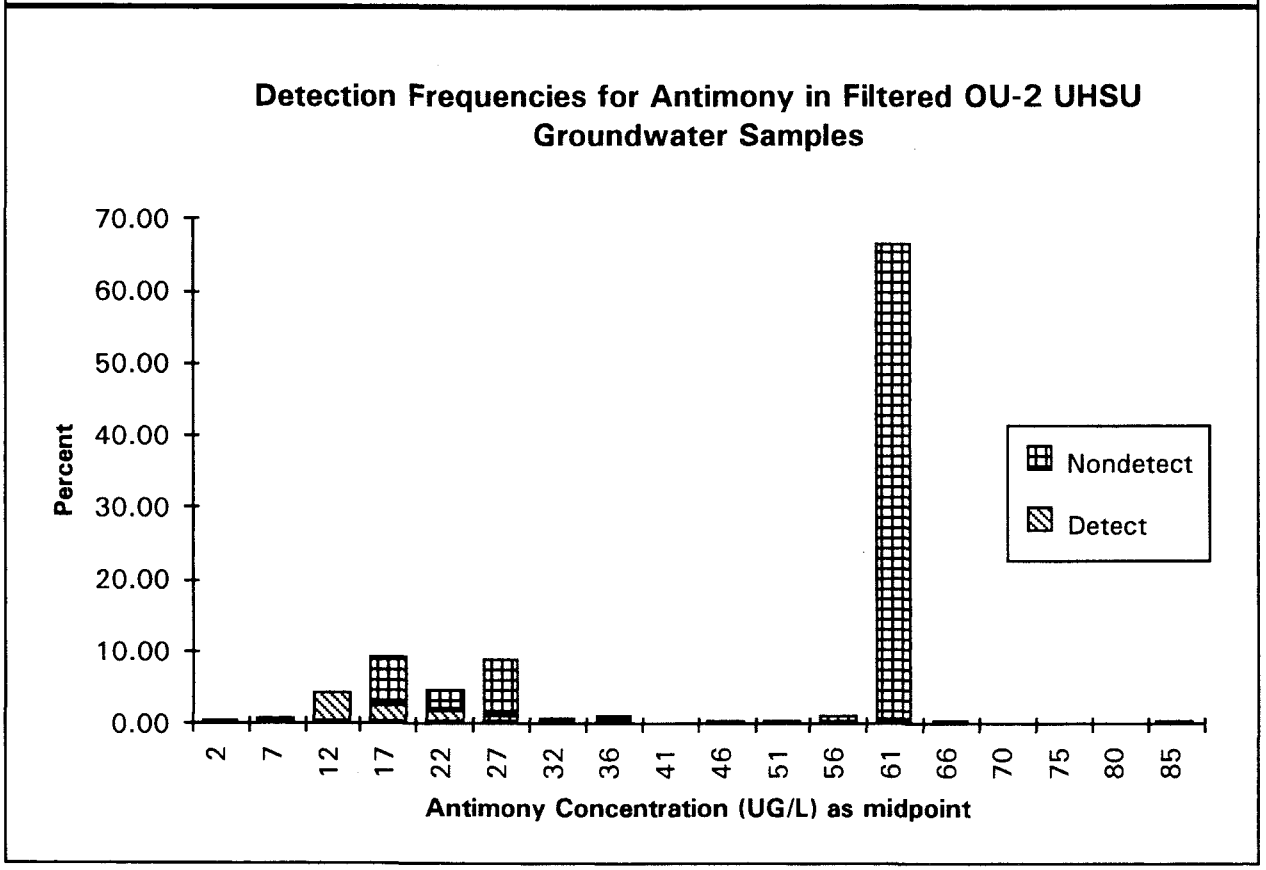

Detection Frequencies for Antimony in Filtered OU-2 UHSU
Groundwater Samples
Percent
70.00
60.00
50.00
40.00
30.00
20.00
10.00
0.00
2
7
12
17
22
27
32
36
41
46
51
56
61
66
70
75
80
85
Antimony Concentration (UG/L) as midpoint
Nondetect
Detect

Figure C-9

Time Series Plots of Antimony Concentrations in OU-2 Filtered UHSU Groundwater Samples

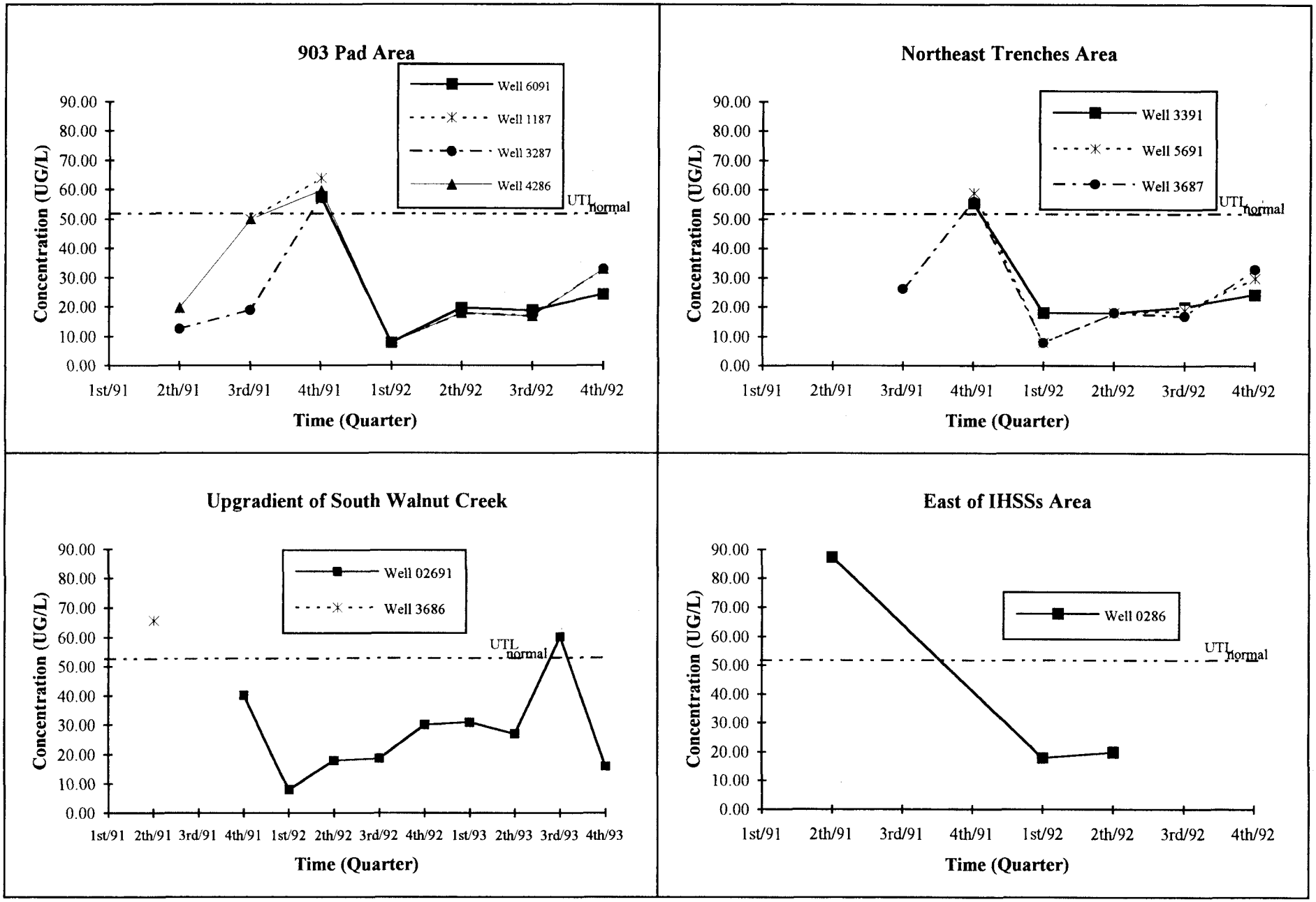


Figure C-10

Time Series Plots of Antimony Concentrations in OU-2 UnFiltered UHSU Groundwater Samples

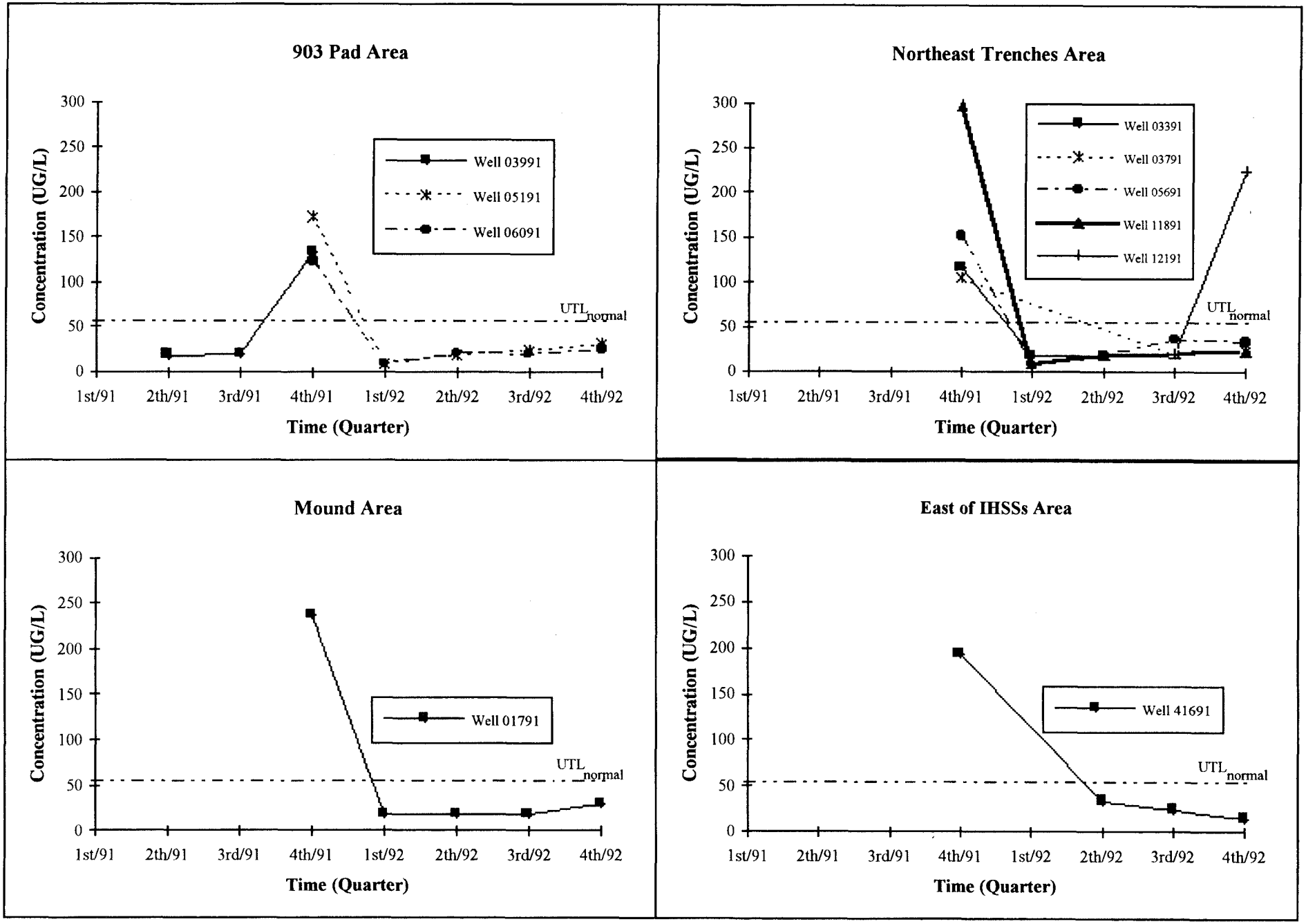


Figure C-11

APPENDIX D
ANALYTICAL RESULTS FOR UNFILTERED ALUMINUM, ANTIMONY, BERYLLIUM, VANADIUM, TSS, AND TDS IN UHSU GROUNDWATER

TABLE D-1
UNFILTERED ALUMINUM IN UHSU GROUNDWATER

location	fieldid	date_sampled	Analyte	RESULT (µg/l)	REP_LIM	qual_lab	qual_wc	location_z
00191	GW02596IT	3/16/92	ALUMINUM	2220.00	200.00		V	UHSU
00191	GW02909IT	5/21/92	ALUMINUM	3180.00	200.00	*	JA	UHSU
00191	GW03435IT	9/1/92	ALUMINUM	9890.00	17.00		V	UHSU
00191	GW03861IT	11/18/92	ALUMINUM	236000.00	200.00	N	JA	UHSU
00291	GW02581IT	3/11/92	ALUMINUM	17400.00	200.00	*	JA	UHSU
00291	GW02910IT	5/21/92	ALUMINUM	20900.00	200.00	*	JA	UHSU
00291	GW03436IT	9/8/92	ALUMINUM	95900.00	17.00		V	UHSU
00291	GW03868IT	11/30/92	ALUMINUM	12300.00	18.00		V	UHSU
00391	GW02158IT	12/17/91	ALUMINUM	11000.00	200.00		V	UHSU
00391	GW02526IT	2/28/92	ALUMINUM	3120.00	200.00	N*	JA	UHSU
00391	GW02915IT	5/21/92	ALUMINUM	1630.00	200.00	*	JA	UHSU
00391	GW03453IT	9/8/92	ALUMINUM	9900.00	17.00		V	UHSU
00391	GW03888IT	11/11/92	ALUMINUM	5020.00	200.00		V	UHSU
00491	GW02159IT	12/18/91	ALUMINUM	10400.00	200.00		V	UHSU
00491	GW02527IT	2/28/92	ALUMINUM	3710.00	200.00	N*	JA	UHSU
00491	GW02916IT	5/20/92	ALUMINUM	7140.00	200.00	N	JA	UHSU
00491	GW03462IT	9/1/92	ALUMINUM	1830.00	17.00		V	UHSU
00491	GW03889IT	11/9/92	ALUMINUM	2870.00	200.00		V	UHSU
01391	GW03259IT	7/30/92	ALUMINUM	463.00	200.00	N*	JA	UHSU
01491	GW02597IT	3/18/92	ALUMINUM	135000.00	200.00		V	UHSU
01491	GW02858IT	5/15/92	ALUMINUM	4160.00	200.00	N	JA	UHSU
01491	GW03260IT	7/30/92	ALUMINUM	58200.00	200.00	N*	JA	UHSU
01491	GW03814IT	11/19/92	ALUMINUM	78600.00	200.00	N	JA	UHSU
01791	GW02173IT	12/19/91	ALUMINUM	104000.00	200.00		V	UHSU
01791	GW02598IT	3/17/92	ALUMINUM	53100.00	200.00	*	JA	UHSU
01791	GW02871IT	5/14/92	ALUMINUM	7400.00	200.00		V	UHSU
01791	GW03283IT	8/3/92	ALUMINUM	47000.00	17.00		V	UHSU
01791	GW03817IT	11/5/92	ALUMINUM	13400.00	200.00		V	UHSU
01891	GW02178IT	12/23/91	ALUMINUM	8420.00	200.00		V	UHSU
01891	GW02509IT	2/27/92	ALUMINUM	10600.00	200.00		V	UHSU
01891	GW02872IT	5/13/92	ALUMINUM	12200.00	200.00		V	UHSU
01891	GW03284IT	7/29/92	ALUMINUM	14700.00	200.00	N*	JA	UHSU
01991	GW02853IT	6/4/92	ALUMINUM	20600.00	200.00		V	UHSU
01991	GW03350IT	9/14/92	ALUMINUM	17100.00	17.00		V	UHSU
01991	GW03907IT	10/23/92	ALUMINUM	5630.00	18.70		JA	UHSU
02091	GW02138IT	12/14/91	ALUMINUM	32300.00	200.00	*	JA	UHSU
02091	GW02510IT	2/26/92	ALUMINUM	13800.00	200.00		V	UHSU
02091	GW02873IT	5/15/92	ALUMINUM	11700.00	200.00		V	UHSU
02091	GW03285IT	7/31/92	ALUMINUM	12500.00	200.00	E	JA	UHSU
02091	GW03819IT	11/6/92	ALUMINUM	31100.00	200.00	*	JA	UHSU
02291	GW02113IT	12/16/91	ALUMINUM	25100.00	200.00	*	JA	UHSU
02291	GW02511IT	2/26/92	ALUMINUM	19000.00	200.00		V	UHSU
02291	GW02874IT	5/14/92	ALUMINUM	11200.00	200.00		V	UHSU
02291	GW03286IT	7/31/92	ALUMINUM	12300.00	200.00	E	JA	UHSU
02291	GW03820IT	10/29/92	ALUMINUM	39900.00	18.70		V	UHSU
02491	GW02114IT	12/16/91	ALUMINUM	8810.00	200.00	*	JA	UHSU
02491	GW02572IT	3/11/92	ALUMINUM	1880.00	200.00	*	JA	UHSU
02491	GW02875IT	5/15/92	ALUMINUM	1970.00	200.00		V	UHSU
02491	GW03287IT	7/31/92	ALUMINUM	5250.00	200.00	E	JA	UHSU
02591	GW03015IT	6/9/92	ALUMINUM	13500.00	200.00	N	JA	UHSU
02591	GW03314IT	8/11/92	ALUMINUM	9540.00	17.00		V	UHSU
02591	GW03904IT	10/20/92	ALUMINUM	6260.00	18.70		JA	UHSU
0286	GW02611IT	3/18/92	ALUMINUM	1180.00	200.00		V	UHSU
0286	GW02955IT	6/10/92	ALUMINUM	7200.00	29.20		JA	UHSU
02991	GW02441IT	3/12/92	ALUMINUM	14900.00	200.00	*	JA	UHSU
02991	GW02854IT	5/8/92	ALUMINUM	19400.00	200.00		V	UHSU
02991	GW03351IT	8/21/92	ALUMINUM	11100.00	17.00		JA	UHSU

TABLE D-1
UNFILTERED ALUMINUM IN UHSU GROUNDWATER

location	fieldid	date_sampled	Analyte	RESULT (µg/l)	REP_LIM	qual_lab	qual_wc	location_z
02991	GW03908IT	10/20/92	ALUMINUM	9580.00	18.70		JA	UHSU
03091	GW02134IT	12/14/91	ALUMINUM	20000.00	200.00	*	JA	UHSU
03091	GW02568IT	3/5/92	ALUMINUM	15700.00	200.00	*	JA	UHSU
03091	GW02881IT	5/12/92	ALUMINUM	6730.00	200.00		V	UHSU
03091	GW03409IT	8/19/92	ALUMINUM	17100.00	17.00		JA	UHSU
03091	GW03914IT	10/22/92	ALUMINUM	18500.00	18.70		JA	UHSU
03191	GW02156IT	12/19/91	ALUMINUM	479.00	200.00		V	UHSU
03191	GW02882IT	5/12/92	ALUMINUM	7950.00	200.00		V	UHSU
03391	GW02092IT	12/5/91	ALUMINUM	40800.00	200.00	N*	JA	UHSU
03391	GW02547IT	3/13/92	ALUMINUM	3520.00	200.00	*	JA	UHSU
03391	GW03006IT	6/2/92	ALUMINUM	61000.00	200.00	N	JA	UHSU
03391	GW03123IT	7/9/92	ALUMINUM	27000.00	200.00	N	JA	UHSU
03391	GW03896IT	10/16/92	ALUMINUM	23600.00	18.70		V	UHSU
03591	GW02161IT	12/19/91	ALUMINUM	26600.00	200.00		V	UHSU
03591	GW02883IT	6/4/92	ALUMINUM	12100.00	200.00		V	UHSU
03591	GW03387IT	8/13/92	ALUMINUM	17800.00	17.00		V	UHSU
03691	GW03048IT	6/8/92	ALUMINUM	55300.00	200.00	N	JA	UHSU
03691	GW03124IT	7/8/92	ALUMINUM	26000.00	200.00	N	JA	UHSU
03691	GW03897IT	10/21/92	ALUMINUM	190000.00	18.70		JA	UHSU
03791	GW02093IT	12/6/91	ALUMINUM	80100.00	200.00	*	JA	UHSU
03791	GW02557IT	3/19/92	ALUMINUM	115000.00	200.00		V	UHSU
03791	GW03007IT	6/10/92	ALUMINUM	15200.00	29.20		V	UHSU
03791	GW03125IT	7/10/92	ALUMINUM	7500.00	200.00	N	JA	UHSU
03791	GW03898IT	10/16/92	ALUMINUM	9500.00	18.70		JA	UHSU
0386	GW01762IT	9/11/91	ALUMINUM	1100.00	200.00		JA	UHSU
0386	GW02026IT	11/13/91	ALUMINUM	559.00	200.00			UHSU
0386	GW02612IT	4/1/92	ALUMINUM	130.00	200.00	B	V	UHSU
0386	GW02956IT	6/12/92	ALUMINUM	293.00	29.20		JA	UHSU
0386	GW03392IT	9/16/92	ALUMINUM	443.00	200.00		V	UHSU
0386	GW03810IT	11/17/92	ALUMINUM	847.00	200.00		V	UHSU
03991	GW03010IT	6/23/92	ALUMINUM	581000.00	200.00	N	JA	UHSU
03991	GW03126IT	7/8/92	ALUMINUM	197000.00	200.00	N	JA	UHSU
03991	GW03899IT	10/21/92	ALUMINUM	1460000.00	93.50		JA	UHSU
04191	GW02923IT	5/19/92	ALUMINUM	.10200.00	200.00	N	JA	UHSU
04291	GW02924IT	5/19/92	ALUMINUM	1170.00	200.00	N	JA	UHSU
04591	GW02175IT	12/20/91	ALUMINUM	32900.00	200.00		V	UHSU
04591	GW02525IT	3/3/92	ALUMINUM	16800.00	200.00	N*	JA	UHSU
04591	GW02931IT	5/22/92	ALUMINUM	15000.00	200.00	*	JA	UHSU
04591	GW03450IT	8/31/92	ALUMINUM	8780.00	17.00		V	UHSU
04591	GW03882IT	12/8/92	ALUMINUM	9990.00	18.00		V	UHSU
04991	GW02939IT	5/21/92	ALUMINUM	11300.00	200.00	*	JA	UHSU
04991	GW03236IT	7/27/92	ALUMINUM	8490.00	200.00		V	UHSU
05091	GW02177IT	12/23/91	ALUMINUM	6720.00	200.00		V	UHSU
05091	GW02619IT	3/26/92	ALUMINUM	6580.00	200.00		V	UHSU
05091	GW02940IT	5/20/92	ALUMINUM	4630.00	200.00	N	JA	UHSU
05091	GW03237IT	7/28/92	ALUMINUM	7260.00	200.00	N*	JA	UHSU
05091	GW03726IT	10/28/92	ALUMINUM	15400.00	200.00	*	JA	UHSU
05191	GW02160IT	12/17/91	ALUMINUM	97100.00	200.00		V	UHSU
05191	GW02571IT	3/5/92	ALUMINUM	6570.00	200.00	*	JA	UHSU
05191	GW02941IT	5/21/92	ALUMINUM	23900.00	200.00	*	JA	UHSU
05191	GW03238IT	7/24/92	ALUMINUM	44200.00	200.00		V	UHSU
05191	GW03727IT	10/28/92	ALUMINUM	46100.00	200.00	*	JA	UHSU
05391	GW02084IT	12/5/91	ALUMINUM	2660.00	200.00	N*	JA	UHSU
05391	GW02566IT	3/5/92	ALUMINUM	18600.00	200.00	*	JA	UHSU
05391	GW02884IT	6/11/92	ALUMINUM	13500.00	29.20		JA	UHSU
05391	GW03388IT	9/10/92	ALUMINUM	9340.00	17.00		V	UHSU
05391	GW03917IT	10/28/92	ALUMINUM	2260.00	200.00	*	JA	UHSU

TABLE D-1
UNFILTERED ALUMINUM IN UHSU GROUNDWATER

location	fieldid	date_sampled	Analyte	RESULT (µg/l)	REP_LIM	qual_lab	qual_wc	location_z
05691	GW02061IT	12/4/91	ALUMINUM	52800.00	200.00	N*	JA	UHSU
05691	GW02549IT	3/12/92	ALUMINUM	40800.00	200.00	*	JA	UHSU
05691	GW02885IT	5/28/92	ALUMINUM	11500.00	200.00		V	UHSU
05691	GW03389IT	8/21/92	ALUMINUM	118000.00	17.00		JA	UHSU
05691	GW03918IT	11/9/92	ALUMINUM	401000.00	200.00		V	UHSU
06091	GW02062IT	12/4/91	ALUMINUM	51700.00	200.00	N*	JA	UHSU
06091	GW02576IT	3/12/92	ALUMINUM	36500.00	200.00	*	JA	UHSU
06091	GW03014IT	6/11/92	ALUMINUM	24200.00	29.20		JA	UHSU
06091	GW03318IT	8/6/92	ALUMINUM	46200.00	17.00		V	UHSU
06091	GW03903IT	10/19/92	ALUMINUM	10900.00	18.70		JA	UHSU
06191	GW03352IT	8/14/92	ALUMINUM	19700.00	17.00		V	UHSU
06491	GW02616IT	4/1/92	ALUMINUM	9070.00	200.00		V	UHSU
06491	GW03049IT	6/22/92	ALUMINUM	8330.00	200.00	N	JA	UHSU
06491	GW03375IT	9/10/92	ALUMINUM	6930.00	17.00		V	UHSU
06591	GW02895IT	5/19/92	ALUMINUM	20600.00	200.00	N	JA	UHSU
06591	GW03427IT	8/27/92	ALUMINUM	34100.00	17.00		JA	UHSU
06591	GW03847IT	11/17/92	ALUMINUM	15500.00	200.00		V	UHSU
06691	GW02896IT	5/18/92	ALUMINUM	2710.00	200.00	N	JA	UHSU
06791	GW02897IT	5/20/92	ALUMINUM	16100.00	200.00	N	JA	UHSU
06891	GW02898IT	5/20/92	ALUMINUM	720.00	200.00	N	JA	UHSU
06891	GW03429IT	8/26/92	ALUMINUM	4900.00	17.00		JA	UHSU
06891	GW03851IT	11/18/92	ALUMINUM	1740.00	200.00	N	JA	UHSU
06991	GW02899IT	5/18/92	ALUMINUM	203000.00	200.00	N	JA	UHSU
06991	GW03430IT	8/26/92	ALUMINUM	56200.00	17.00		JA	UHSU
06991	GW03850IT	11/18/92	ALUMINUM	74900.00	200.00	N	JA	UHSU
07191	GW02900IT	5/18/92	ALUMINUM	54700.00	200.00	N	JA	UHSU
07191	GW03455IT	8/27/92	ALUMINUM	77600.00	17.00		JA	UHSU
07391	GW02599IT	3/16/92	ALUMINUM	1140.00	200.00		V	UHSU
07391	GW02902IT	5/21/92	ALUMINUM	2320.00	200.00	*	JA	UHSU
07391	GW03457IT	8/28/92	ALUMINUM	807.00	17.00		JA	UHSU
07391	GW03862IT	11/16/92	ALUMINUM	718.00	200.00		V	UHSU
07891	GW02434IT	3/12/92	ALUMINUM	6790.00	200.00	*	JA	UHSU
07891	GW02855IT	5/7/92	ALUMINUM	18100.00	200.00	*	JA	UHSU
07891	GW03353IT	8/20/92	ALUMINUM	21400.00	17.00		JA	UHSU
07891	GW03909IT	10/23/92	ALUMINUM	7640.00	18.70		JA	UHSU
07991	GW02925IT	5/20/92	ALUMINUM	20500.00	200.00	N	JA	UHSU
07991	GW03322IT	8/26/92	ALUMINUM	1010.00	17.00		JA	UHSU
08891	GW03065IT	6/23/92	ALUMINUM	7570.00	200.00	N	JA	UHSU
08891	GW03431IT	8/31/92	ALUMINUM	10400.00	17.00		V	UHSU
08891	GW03849IT	11/17/92	ALUMINUM	4810.00	200.00		V	UHSU
09091	GW02903IT	5/20/92	ALUMINUM	253000.00	200.00	N	JA	UHSU
09091	GW03432IT	8/31/92	ALUMINUM	71800.00	17.00		V	UHSU
09091	GW03852IT	11/18/92	ALUMINUM	8220.00	200.00	N	JA	UHSU
09691	GW02608IT	3/18/92	ALUMINUM	4470.00	200.00		V	UHSU
09691	GW02904IT	5/22/92	ALUMINUM	7670.00	200.00	*	JA	UHSU
09691	GW03458IT	8/31/92	ALUMINUM	4170.00	17.00		V	UHSU
09691	GW03865IT	11/17/92	ALUMINUM	10600.00	200.00		V	UHSU
0987	GW01667IT	8/16/91	ALUMINUM	8710.00	200.00	*	JA	UHSU
0987	GW02088IT	12/16/91	ALUMINUM	3060.00	200.00	*	JA	UHSU
0987	GW02402IT	3/6/92	ALUMINUM	3030.00	200.00	*	JA	UHSU
0987	GW02942IT	5/26/92	ALUMINUM	13900.00	200.00	*	JA	UHSU
0987	GW03179IT	7/16/92	ALUMINUM	1070.00	200.00		V	UHSU
0987	GW03708IT	12/10/92	ALUMINUM	3660.00	200.00		V	UHSU
10991	GW02436IT	2/6/92	ALUMINUM	128000.00	200.00	*	JA	UHSU
10991	GW02943IT	5/22/92	ALUMINUM	106000.00	200.00	*	JA	UHSU
10991	GW03289IT	7/28/92	ALUMINUM	14400.00	200.00	N*	JA	UHSU
10991	GW03728IT	10/23/92	ALUMINUM	12700.00	18.70		JA	UHSU

TABLE D-1
UNFILTERED ALUMINUM IN UHSU GROUNDWATER

location	fieldid	date_sampled	Analyte	RESULT (µg/l)	REP_LIM	qual_lab	qual_wc	location_z
11491	GW02886IT	5/28/92	ALUMINUM	8660.00	200.00		V	UHSU
11691	GW03011IT	6/8/92	ALUMINUM	5380.00	200.00		V	UHSU
11691	GW03127IT	7/10/92	ALUMINUM	7990.00	200.00	N	JA	UHSU
11791	GW02432IT	2/6/92	ALUMINUM	32100.00	200.00	*	JA	UHSU
11791	GW02917IT	5/20/92	ALUMINUM	19400.00	200.00	N	JA	UHSU
11791	GW03465IT	9/8/92	ALUMINUM	11100.00	17.00		V	UHSU
11791	GW03890IT	11/11/92	ALUMINUM	4260.00	200.00		V	UHSU
11791	GW03891IT	11/12/92	ALUMINUM	241.00	200.00		V	UHSU
1187	GW01648IT	9/6/91	ALUMINUM	821.00	200.00		V	UHSU
1187	GW02004IT	11/21/91	ALUMINUM	324.00	200.00		V	UHSU
1187	GW03460IT	9/1/92	ALUMINUM	156.00	200.00	U	V	UHSU
11891	GW02117IT	12/19/91	ALUMINUM	128000.00	200.00		V	UHSU
11891	GW02552IT	2/28/92	ALUMINUM	47300.00	200.00	N*	JA	UHSU
11891	GW03012IT	6/2/92	ALUMINUM	26500.00	200.00	N	JA	UHSU
11891	GW03128IT	7/9/92	ALUMINUM	33600.00	200.00	N	JA	UHSU
11891	GW03901IT	10/16/92	ALUMINUM	34000.00	18.70		V	UHSU
12091	GW02116IT	12/19/91	ALUMINUM	11600.00	200.00		V	UHSU
12091	GW02514IT	2/27/92	ALUMINUM	6440.00	200.00		V	UHSU
12091	GW02876IT	5/13/92	ALUMINUM	22400.00	200.00		V	UHSU
12091	GW03290IT	7/29/92	ALUMINUM	12900.00	200.00	N*	JA	UHSU
12091	GW03822IT	11/10/92	ALUMINUM	8430.00	200.00		V	UHSU
12191	GW02440IT	3/16/92	ALUMINUM	60800.00	200.00		V	UHSU
12191	GW02862IT	6/3/92	ALUMINUM	21100.00	200.00		V	UHSU
12191	GW03410IT	8/19/92	ALUMINUM	33500.00	17.00		JA	UHSU
12191	GW03910IT	10/21/92	ALUMINUM	886000.00	93.50		JA	UHSU
12291	GW02607IT	3/17/92	ALUMINUM	19700.00	200.00	*	JA	UHSU
12291	GW02859IT	5/29/92	ALUMINUM	2770.00	200.00		V	UHSU
12391	GW02438IT	2/12/92	ALUMINUM	73400.00	200.00		V	UHSU
12391	GW02887IT	5/14/92	ALUMINUM	19000.00	200.00		V	UHSU
12391	GW03421IT	9/15/92	ALUMINUM	16000.00	18.70		JA	UHSU
12391	GW03919IT	12/3/92	ALUMINUM	8760.00	200.00		V	UHSU
12491	GW02435IT	2/7/92	ALUMINUM	150000.00	200.00		V	UHSU
12491	GW02888IT	5/14/92	ALUMINUM	32000.00	200.00		V	UHSU
12491	GW03422IT	9/14/92	ALUMINUM	44000.00	17.00		V	UHSU
12491	GW03922IT	10/22/92	ALUMINUM	131000.00	18.70		JA	UHSU
12691	GW02437IT	2/13/92	ALUMINUM	30900.00	200.00	*	JA	UHSU
12691	GW02889IT	5/29/92	ALUMINUM	2430.00	200.00		V	UHSU
12691	GW03423IT	9/10/92	ALUMINUM	1070.00	17.00		V	UHSU
12691	GW03923IT	10/23/92	ALUMINUM	2810.00	18.70		JA	UHSU
1287	GW01647IT	9/9/91	ALUMINUM	836.00	200.00		V	UHSU
1287	GW02921IT	5/18/92	ALUMINUM	706.00	200.00	N	JA	UHSU
12991	GW02601IT	3/17/92	ALUMINUM	8510.00	200.00	*	JA	UHSU
12991	GW02911IT	5/22/92	ALUMINUM	15000.00	200.00	*	JA	UHSU
12991	GW03437IT	8/28/92	ALUMINUM	21400.00	34.00		JA	UHSU
12991	GW03867IT	11/30/92	ALUMINUM	19400.00	18.00		V	UHSU
13091	GW02912IT	5/22/92	ALUMINUM	283.00	200.00	*	JA	UHSU
13091	GW03440IT	9/9/92	ALUMINUM	3460.00	17.00		V	UHSU
13191	GW02905IT	5/19/92	ALUMINUM	23400.00	200.00	N	JA	UHSU
13191	GW03433IT	9/2/92	ALUMINUM	9070.00	17.00		V	UHSU
13191	GW03855IT	11/17/92	ALUMINUM	6280.00	200.00		V	UHSU
13391	GW03016IT	6/8/92	ALUMINUM	26500.00	200.00		V	UHSU
13391	GW03354IT	8/20/92	ALUMINUM	34600.00	17.00		JA	UHSU
13391	GW03906IT	10/20/92	ALUMINUM	7820.00	18.70		JA	UHSU
13491	GW03063IT	6/24/92	ALUMINUM	81700.00	200.00	N	JA	UHSU
13491	GW03411IT	8/21/92	ALUMINUM	59800.00	17.00		JA	UHSU
13491	GW03928IT	10/22/92	ALUMINUM	300000.00	18.70		JA	UHSU
1487	GW01646IT	9/5/91	ALUMINUM	354.00	200.00		V	UHSU

TABLE D-1
UNFILTERED ALUMINUM IN UHSU GROUNDWATER

location	fieldid	date_sampled	Analyte	RESULT (µg/l)	REP_LIM	qual_lab	qual_wc	location_z
1487	GW02003IT	11/21/91	ALUMINUM	151.00	200.00	B		UHSU
1487	GW02388IT	2/21/92	ALUMINUM	326.00	200.00		V	UHSU
1487	GW02922IT	5/20/92	ALUMINUM	198.00	200.00	BN	JA	UHSU
1487	GW03461IT	8/31/92	ALUMINUM	133.00	200.00	U	V	UHSU
1587	GW01650IT	9/4/91	ALUMINUM	36000.00	200.00		V	UHSU
1587	GW02005IT	12/18/91	ALUMINUM	9150.00	200.00		V	UHSU
1587	GW02422IT	2/25/92	ALUMINUM	31400.00	200.00	N	JA	UHSU
1587	GW02914IT	6/23/92	ALUMINUM	29300.00	200.00	N	JA	UHSU
1587	GW03442IT	9/1/92	ALUMINUM	21400.00	200.00		V	UHSU
1787	GW01687IT	8/19/91	ALUMINUM	1240.00	200.00	*	JA	UHSU
1787	GW02031IT	11/18/91	ALUMINUM	13300.00	200.00		V	UHSU
1787	GW02424IT	2/24/92	ALUMINUM	1200.00	200.00	N	JA	UHSU
1787	GW02844IT	4/30/92	ALUMINUM	3120.00	200.00	*	JA	UHSU
1787	GW03281IT	7/29/92	ALUMINUM	818.00	200.00	N*	JA	UHSU
1787	GW03823IT	11/10/92	ALUMINUM	3750.00	200.00		V	UHSU
2387	GW01669IT	8/19/91	ALUMINUM	2550.00	200.00	*	JA	UHSU
2387	GW02032IT	11/23/91	ALUMINUM	10700.00	200.00		V	UHSU
2387	GW02405IT	2/28/92	ALUMINUM	3720.00	200.00	N*	JA	UHSU
2387	GW02845IT	5/28/92	ALUMINUM	2600.00	200.00		V	UHSU
2387	GW03256IT	7/30/92	ALUMINUM	2030.00	200.00	N*	JA	UHSU
2387	GW03816IT	11/6/92	ALUMINUM	6780.00	200.00		V	UHSU
2587	GW01685IT	9/10/91	ALUMINUM	7370.00	200.00		V	UHSU
2587	GW02039IT	11/18/91	ALUMINUM	6270.00	200.00		V	UHSU
2587	GW02406IT	3/3/92	ALUMINUM	2230.00	200.00	N*	JA	UHSU
2587	GW02865IT	5/15/92	ALUMINUM	870.00	200.00	N	JA	UHSU
2587	GW03348IT	9/22/92	ALUMINUM	2040.00	200.00		V	UHSU
2587	GW03912IT	10/27/92	ALUMINUM	459.00	200.00		JA	UHSU
2987	GW01703IT	8/21/91	ALUMINUM	6100.00	200.00	*	JA	UHSU
2987	GW02080IT	12/7/91	ALUMINUM	5670.00	200.00	*	JA	UHSU
2987	GW02412IT	2/12/92	ALUMINUM	5230.00	200.00		V	UHSU
2987	GW03058IT	6/9/92	ALUMINUM	4960.00	200.00	N	JA	UHSU
2987	GW03292IT	7/31/92	ALUMINUM	9090.00	200.00	E	JA	UHSU
2987	GW03730IT	10/27/92	ALUMINUM	12600.00	200.00		V	UHSU
3287	GW01642IT	9/4/91	ALUMINUM	36800.00	200.00		V	UHSU
3287	GW02012IT	11/22/91	ALUMINUM	8530.00	200.00		V	UHSU
3287	GW02429IT	2/25/92	ALUMINUM	28000.00	200.00	N	JA	UHSU
3287	GW02936IT	5/18/92	ALUMINUM	21700.00	200.00	N	JA	UHSU
3287	GW03447IT	9/9/92	ALUMINUM	18200.00	200.00		V	UHSU
3287	GW03880IT	11/30/92	ALUMINUM	13300.00	18.00		V	UHSU
34791	GW02157IT	12/17/91	ALUMINUM	5720.00	200.00		V	UHSU
34791	GW02447IT	2/10/92	ALUMINUM	2180.00	200.00	N	JA	UHSU
34791	GW02908IT	5/20/92	ALUMINUM	3920.00	200.00	N	JA	UHSU
34791	GW03459IT	9/2/92	ALUMINUM	4150.00	17.00		V	UHSU
34791	GW03863IT	11/16/92	ALUMINUM	4510.00	200.00		V	UHSU
3586	GW01818IT	10/8/91	ALUMINUM	145.00	200.00	U	JA	UHSU
3586	GW02195IT	1/10/92	ALUMINUM	2170.00	200.00		V	UHSU
3586	GW02631IT	4/7/92	ALUMINUM	698.00	200.00	N	JA	UHSU
3586	GW03217IT	8/5/92	ALUMINUM	35.80	200.00	U	JA	UHSU
3586	GW03828IT	12/10/92	ALUMINUM	2870.00	200.00		V	UHSU
3687	GW01674IT	8/23/91	ALUMINUM	1790.00	200.00	*	JA	UHSU
3687	GW02036IT	11/25/91	ALUMINUM	1290.00	200.00	N*	JA	UHSU
3687	GW02414IT	3/5/92	ALUMINUM	1400.00	200.00	*	JA	UHSU
3687	GW02852IT	5/15/92	ALUMINUM	229.00	200.00	N	JA	UHSU
3687	GW03384IT	8/17/92	ALUMINUM	6890.00	200.00	N	JA	UHSU
3687	GW03924IT	10/27/92	ALUMINUM	8280.00	200.00		V	UHSU
3986	GW01592IT	8/16/91	ALUMINUM	2980.00	200.00	*	JA	UHSU
3986	GW02049IT	12/5/91	ALUMINUM	1080.00	200.00	N*	JA	UHSU

TABLE D-1
UNFILTERED ALUMINUM IN UHSU GROUNDWATER

location	fieldid	date_sampled	Analyte	RESULT (µg/l)	REP_LIM	qual_lab	qual_wc	location_z
3986	GW02241IT	1/21/92	ALUMINUM	7460.00	200.00		V	UHSU
3986	GW02668IT	4/16/92	ALUMINUM	3750.00	200.00		V	UHSU
3986	GW03328IT	9/8/92	ALUMINUM	3930.00	200.00		V	UHSU
3986	GW03893IT	10/19/92	ALUMINUM	14000.00	200.00	N	JA	UHSU
41591	GW02091IT	12/6/91	ALUMINUM	26300.00	200.00	*	JA	UHSU
41591	GW02614IT	3/18/92	ALUMINUM	14100.00	200.00		V	UHSU
41591	GW02952IT	6/10/92	ALUMINUM	42800.00	29.20		JA	UHSU
41591	GW03395IT	9/15/92	ALUMINUM	16700.00	18.70		JA	UHSU
41591	GW03811IT	11/17/92	ALUMINUM	6500.00	200.00		V	UHSU
41691	GW02090IT	12/7/91	ALUMINUM	117000.00	200.00	*	JA	UHSU
41691	GW02615IT	4/1/92	ALUMINUM	30100.00	200.00		V	UHSU
41691	GW02953IT	6/11/92	ALUMINUM	64200.00	29.20		JA	UHSU
41691	GW03396IT	9/16/92	ALUMINUM	25400.00	18.70		JA	UHSU
41691	GW03806IT	11/18/92	ALUMINUM	15300.00	200.00	N	JA	UHSU
4286	GW01706IT	9/11/91	ALUMINUM	22600.00	200.00		JA	UHSU
4286	GW02044IT	12/4/91	ALUMINUM	956.00	200.00	N*	JA	UHSU
4286	GW02398IT	2/10/92	ALUMINUM	30800.00	200.00	N	JA	UHSU
4286	GW02846IT	5/29/92	ALUMINUM	9990.00	200.00		V	UHSU
4286	GW03385IT	8/17/92	ALUMINUM	19700.00	200.00	N	JA	UHSU
4286	GW03925IT	11/30/92	ALUMINUM	4650.00	18.00		V	UHSU
6286	GW01708IT	8/22/91	ALUMINUM	303.00	200.00	*	JA	UHSU
6286	GW02046IT	11/25/91	ALUMINUM	534.00	200.00		V	UHSU
6286	GW02378IT	2/11/92	ALUMINUM	338.00	200.00		V	UHSU
6286	GW03056IT	6/11/92	ALUMINUM	1330.00	29.20		JA	UHSU
6286	GW03294IT	7/31/92	ALUMINUM	685.00	200.00	N	V	UHSU
6286	GW03885IT	11/9/92	ALUMINUM	218.00	200.00		JA	UHSU
6586	GW01671IT	8/16/91	ALUMINUM	749.00	200.00	*	JA	UHSU
6586	GW02050IT	12/6/91	ALUMINUM	953.00	200.00	*	JA	UHSU
6586	GW02326IT	1/23/92	ALUMINUM	1430.00	200.00	N*		UHSU
6586	GW02840IT	4/30/92	ALUMINUM	601.00	200.00	*	JA	UHSU
6586	GW03308IT	8/6/92	ALUMINUM	546.00	200.00	E	JA	UHSU
6586	GW03947IT	12/14/92	ALUMINUM	1010.00	18.00		V	UHSU
B218789	GW01673IT	20-Aug-91	ALUMINUM	517.00	200.00	*	JA	UHSU
B218789	GW02034IT	19-Nov-91	ALUMINUM	14600.00	200.00			UHSU
B218789	GW02419IT	18-Feb-92	ALUMINUM	6530.00	200.00		V	UHSU
B218789	GW02866IT	8-May-92	ALUMINUM	550.00	200.00		V	UHSU
B218789	GW03349IT	21-Aug-92	ALUMINUM	3880.00	17.00		JA	UHSU
B218789	GW03913IT	27-Oct-92	ALUMINUM	2370.00	200.00		V	UHSU

TABLE D-2
UNFILTERED ANTIMONY IN UHSU GROUNDWATER

location	fieldid	date_sampled	Analyte	RESULT (µg/l)	REP_LIM	qual_lab	qual_wc	location_z
00191	GW02909IT	5/21/92	ANTIMONY	18.00	60.00	U	V	UHSU
00191	GW03435IT	9/1/92	ANTIMONY	35.80	18.80		JA	UHSU
00191	GW03861IT	11/18/92	ANTIMONY	14.00	60.00	U	V	UHSU
00291	GW02581IT	3/11/92	ANTIMONY	8.00	60.00	UN	JA	UHSU
00291	GW02910IT	5/21/92	ANTIMONY	18.00	60.00	U	V	UHSU
00291	GW03436IT	9/8/92	ANTIMONY	44.80	18.80		JA	UHSU
00291	GW03868IT	11/30/92	ANTIMONY	33.00	17.00	U	V	UHSU
00391	GW02158IT	12/17/91	ANTIMONY	48.30	60.00	U	JA	UHSU
00391	GW02526IT	2/28/92	ANTIMONY	8.00	60.00	U	JA	UHSU
00391	GW02915IT	5/21/92	ANTIMONY	18.00	60.00	U	V	UHSU
00391	GW03453IT	9/8/92	ANTIMONY	42.20	18.80		JA	UHSU
00391	GW03888IT	11/11/92	ANTIMONY	30.00	60.00	U	V	UHSU
00491	GW02159IT	12/18/91	ANTIMONY	47.20	60.00	U	JA	UHSU
00491	GW02527IT	2/28/92	ANTIMONY	8.00	60.00	U	JA	UHSU
00491	GW02916IT	5/20/92	ANTIMONY	18.00	60.00	U	V	UHSU
00491	GW03462IT	9/1/92	ANTIMONY	43.80	18.80		JA	UHSU
00491	GW03889IT	11/9/92	ANTIMONY	30.00	60.00	U	V	UHSU
01391	GW03259IT	7/30/92	ANTIMONY	20.00	60.00	U	V	UHSU
01491	GW02858IT	5/15/92	ANTIMONY	18.00	60.00	U	V	UHSU
01491	GW03260IT	7/30/92	ANTIMONY	20.00	60.00	U	V	UHSU
01491	GW03814IT	11/19/92	ANTIMONY	14.00	60.00	U	V	UHSU
01791	GW02173IT	12/19/91	ANTIMONY	236.00	60.00		JA	UHSU
01791	GW02598IT	3/17/92	ANTIMONY	18.00	60.00	U	V	UHSU
01791	GW02871IT	5/14/92	ANTIMONY	18.00	60.00	U	V	UHSU
01791	GW03283IT	8/3/92	ANTIMONY	18.80	18.80	U	V	UHSU
01791	GW03817IT	11/5/92	ANTIMONY	30.00	60.00	U	V	UHSU
01891	GW02178IT	12/23/91	ANTIMONY	55.40	60.00	U	JA	UHSU
01891	GW02509IT	2/27/92	ANTIMONY	8.00	60.00	U	V	UHSU
01891	GW02872IT	5/13/92	ANTIMONY	18.00	60.00	U	V	UHSU
01891	GW03284IT	7/29/92	ANTIMONY	22.60	60.00	B	V	UHSU
01991	GW02853IT	6/4/92	ANTIMONY	18.00	60.00	UN	JA	UHSU
01991	GW03350IT	9/14/92	ANTIMONY	42.80	18.80		JA	UHSU
01991	GW03907IT	10/23/92	ANTIMONY	24.40	24.40	U	V	UHSU
02091	GW02138IT	12/14/91	ANTIMONY	71.80	60.00		V	UHSU
02091	GW02510IT	2/26/92	ANTIMONY	10.10	60.00	B	V	UHSU
02091	GW02873IT	5/15/92	ANTIMONY	18.00	60.00	U	V	UHSU
02091	GW03285IT	7/31/92	ANTIMONY	17.00	60.00	U	V	UHSU
02091	GW03819IT	11/6/92	ANTIMONY	30.00	60.00	U	V	UHSU
02291	GW02113IT	12/16/91	ANTIMONY	63.50	60.00		V	UHSU
02291	GW02511IT	2/26/92	ANTIMONY	8.00	60.00	U	V	UHSU
02291	GW02874IT	5/14/92	ANTIMONY	18.00	60.00	U	V	UHSU
02291	GW03286IT	7/31/92	ANTIMONY	17.00	60.00	U	V	UHSU
02291	GW03820IT	10/29/92	ANTIMONY	25.50	24.40		JA	UHSU
02491	GW02114IT	12/16/91	ANTIMONY	29.40	60.00	B	V	UHSU
02491	GW02572IT	3/11/92	ANTIMONY	8.00	60.00	UN	JA	UHSU
02491	GW02875IT	5/15/92	ANTIMONY	18.00	60.00	U	V	UHSU
02491	GW03287IT	7/31/92	ANTIMONY	17.00	60.00	U	V	UHSU
02591	GW03015IT	6/9/92	ANTIMONY	18.00	60.00	U	V	UHSU
02591	GW03314IT	8/11/92	ANTIMONY	20.40	18.80		JA	UHSU
02591	GW03904IT	10/20/92	ANTIMONY	24.40	24.40	U	V	UHSU
0286	GW02955IT	6/10/92	ANTIMONY	19.80	19.80	U	V	UHSU
02991	GW02441IT	3/12/92	ANTIMONY	8.00	60.00	UN	JA	UHSU
02991	GW02854IT	5/8/92	ANTIMONY	18.00	60.00	UN	JA	UHSU
02991	GW03351IT	8/21/92	ANTIMONY	18.80	18.80	U	V	UHSU
02991	GW03908IT	10/20/92	ANTIMONY	24.40	24.40	U	V	UHSU
03091	GW02134IT	12/14/91	ANTIMONY	57.30	60.00	B	V	UHSU
03091	GW02568IT	3/5/92	ANTIMONY	8.00	60.00	UN	JA	UHSU

TABLE D-2
UNFILTERED ANTIMONY IN UHSU GROUNDWATER

location	fieldid	date_sampled	Analyte	RESULT (µg/l)	REP_LIM	qual_lab	qual_wc	location_z
03091	GW02881IT	5/12/92	ANTIMONY	18.00	60.00	UN	JA	UHSU
03091	GW03409IT	8/19/92	ANTIMONY	27.20	18.80		JA	UHSU
03091	GW03914IT	10/22/92	ANTIMONY	24.40	24.40	U	V	UHSU
03191	GW02156IT	12/19/91	ANTIMONY	27.00	60.00	U	JA	UHSU
03191	GW02882IT	5/12/92	ANTIMONY	18.00	60.00	UN	JA	UHSU
03391	GW02092IT	12/5/91	ANTIMONY	117.00	60.00		JA	UHSU
03391	GW02547IT	3/13/92	ANTIMONY	18.00	60.00	U	V	UHSU
03391	GW03006IT	6/2/92	ANTIMONY	18.00	60.00	U	V	UHSU
03391	GW03123IT	7/9/92	ANTIMONY	20.00	60.00	U	V	UHSU
03391	GW03896IT	10/16/92	ANTIMONY	24.40	24.40	U	V	UHSU
03591	GW02161IT	12/19/91	ANTIMONY	74.60	60.00		JA	UHSU
03591	GW02883IT	6/4/92	ANTIMONY	18.00	60.00	UN	JA	UHSU
03591	GW03387IT	8/13/92	ANTIMONY	38.60	18.80		JA	UHSU
03691	GW03048IT	6/8/92	ANTIMONY	18.00	60.00	U	V	UHSU
03691	GW03124IT	7/8/92	ANTIMONY	20.00	60.00	U	V	UHSU
03691	GW03897IT	10/21/92	ANTIMONY	46.30	24.40		V	UHSU
03791	GW02093IT	12/6/91	ANTIMONY	104.00	60.00		V	UHSU
03791	GW03007IT	6/10/92	ANTIMONY	19.80	19.80	U	V	UHSU
03791	GW03125IT	7/10/92	ANTIMONY	20.00	60.00	U	V	UHSU
03791	GW03898IT	10/16/92	ANTIMONY	24.40	24.40	U	V	UHSU
0386	GW01762IT	9/11/91	ANTIMONY	50.00	60.00	U	V	UHSU
0386	GW02026IT	11/13/91	ANTIMONY	40.40	60.00	B		UHSU
0386	GW02956IT	6/12/92	ANTIMONY	19.80	19.80	U	V	UHSU
0386	GW03392IT	9/16/92	ANTIMONY	17.00	60.00	U	V	UHSU
0386	GW03810IT	11/17/92	ANTIMONY	33.00	60.00	U	V	UHSU
03991	GW03010IT	6/23/92	ANTIMONY	18.00	60.00	U	V	UHSU
03991	GW03126IT	7/8/92	ANTIMONY	20.00	60.00	U	V	UHSU
03991	GW03899IT	10/21/92	ANTIMONY	132.00	122.00		JA	UHSU
04191	GW02923IT	5/19/92	ANTIMONY	18.00	60.00	U	V	UHSU
04291	GW02924IT	5/19/92	ANTIMONY	18.00	60.00	U	V	UHSU
04591	GW02175IT	12/20/91	ANTIMONY	79.20	60.00		JA	UHSU
04591	GW02525IT	3/3/92	ANTIMONY	8.00	60.00	U	V	UHSU
04591	GW02931IT	5/22/92	ANTIMONY	18.00	60.00	U	V	UHSU
04591	GW03450IT	8/31/92	ANTIMONY	36.00	18.80		JA	UHSU
04591	GW03882IT	12/8/92	ANTIMONY	33.00	17.00	U	V	UHSU
04991	GW02939IT	5/21/92	ANTIMONY	18.00	60.00	U	V	UHSU
04991	GW03236IT	7/27/92	ANTIMONY	20.00	60.00	U	V	UHSU
05091	GW02177IT	12/23/91	ANTIMONY	48.60	60.00	U	JA	UHSU
05091	GW02940IT	5/20/92	ANTIMONY	18.00	60.00	U	V	UHSU
05091	GW03237IT	7/28/92	ANTIMONY	20.00	60.00	U	V	UHSU
05091	GW03726IT	10/28/92	ANTIMONY	30.00	60.00	U	V	UHSU
05191	GW02160IT	12/17/91	ANTIMONY	172.00	60.00		JA	UHSU
05191	GW02571IT	3/5/92	ANTIMONY	8.00	60.00	UN	JA	UHSU
05191	GW02941IT	5/21/92	ANTIMONY	18.00	60.00	U	V	UHSU
05191	GW03238IT	7/24/92	ANTIMONY	22.70	60.00	U	JA	UHSU
05191	GW03727IT	10/28/92	ANTIMONY	30.00	60.00	U	V	UHSU
05391	GW02084IT	12/5/91	ANTIMONY	59.60	60.00	U	JA	UHSU
05391	GW02566IT	3/5/92	ANTIMONY	8.00	60.00	UN	JA	UHSU
05391	GW02884IT	6/11/92	ANTIMONY	19.80	19.80	U	V	UHSU
05391	GW03388IT	9/10/92	ANTIMONY	40.00	18.80		JA	UHSU
05391	GW03917IT	10/28/92	ANTIMONY	30.00	60.00	U	V	UHSU
05691	GW02061IT	12/4/91	ANTIMONY	151.00	60.00		JA	UHSU
05691	GW02549IT	3/12/92	ANTIMONY	8.00	60.00	UN	JA	UHSU
05691	GW02885IT	5/28/92	ANTIMONY	18.00	60.00	U	V	UHSU
05691	GW03389IT	8/21/92	ANTIMONY	35.60	18.80		JA	UHSU
05691	GW03918IT	11/9/92	ANTIMONY	32.80	60.00	B	V	UHSU
06091	GW02062IT	12/4/91	ANTIMONY	123.00	60.00		JA	UHSU

TABLE D-2
UNFILTERED ANTIMONY IN UHSU GROUNDWATER

location	fieldid	date_sampled	Analyte	RESULT (pg/l)	REP_LIM	qual_lab	qual_wc	location_z
06091	GW02576IT	3/12/92	ANTIMONY	8.00	60.00	UN	JA	UHSU
06091	GW03014IT	6/11/92	ANTIMONY	19.80	19.80	U	V	UHSU
06091	GW03318IT	8/6/92	ANTIMONY	18.80	18.80	U	V	UHSU
06091	GW03903IT	10/19/92	ANTIMONY	24.40	24.40	U	V	UHSU
06191	GW03352IT	8/14/92	ANTIMONY	18.80	18.80	U	V	UHSU
06491	GW03049IT	6/22/92	ANTIMONY	18.00	60.00	U	V	UHSU
06491	GW03375IT	9/10/92	ANTIMONY	43.30	18.80		JA	UHSU
06591	GW02895IT	5/19/92	ANTIMONY	18.00	60.00	U	V	UHSU
06591	GW03427IT	8/27/92	ANTIMONY	76.50	18.80		JA	UHSU
06591	GW03847IT	11/17/92	ANTIMONY	33.00	60.00	U	V	UHSU
06691	GW02896IT	5/18/92	ANTIMONY	18.00	60.00	U	V	UHSU
06791	GW02897IT	5/20/92	ANTIMONY	18.00	60.00	U	V	UHSU
06891	GW02898IT	5/20/92	ANTIMONY	18.00	60.00	U	V	UHSU
06891	GW03429IT	8/26/92	ANTIMONY	18.80	18.80	U	V	UHSU
06891	GW03851IT	11/18/92	ANTIMONY	14.00	60.00	U	V	UHSU
06991	GW03430IT	8/26/92	ANTIMONY	37.50	18.80		JA	UHSU
06991	GW03850IT	11/18/92	ANTIMONY	14.00	60.00	U	V	UHSU
07191	GW02900IT	5/18/92	ANTIMONY	18.00	60.00	U	V	UHSU
07191	GW03455IT	8/27/92	ANTIMONY	32.90	18.80		JA	UHSU
07391	GW03457IT	8/28/92	ANTIMONY	44.10	18.80		JA	UHSU
07391	GW03862IT	11/16/92	ANTIMONY	33.00	60.00	U	V	UHSU
07891	GW02434IT	3/12/92	ANTIMONY	18.00	60.00	U	V	UHSU
07891	GW02855IT	5/7/92	ANTIMONY	18.00	60.00	UN	JA	UHSU
07891	GW03353IT	8/20/92	ANTIMONY	18.80	18.80	U	V	UHSU
07891	GW03909IT	10/23/92	ANTIMONY	24.40	24.40	U	V	UHSU
07991	GW02925IT	5/20/92	ANTIMONY	18.00	60.00	U	V	UHSU
07991	GW03322IT	8/26/92	ANTIMONY	23.00	18.80		JA	UHSU
08891	GW03065IT	6/23/92	ANTIMONY	18.00	60.00	U	V	UHSU
08891	GW03431IT	8/31/92	ANTIMONY	38.30	18.80		JA	UHSU
08891	GW03849IT	11/17/92	ANTIMONY	33.00	60.00	U	V	UHSU
09091	GW02903IT	5/20/92	ANTIMONY	34.60	60.00	B	JA	UHSU
09091	GW03432IT	8/31/92	ANTIMONY	44.40	18.80		JA	UHSU
09091	GW03852IT	11/18/92	ANTIMONY	14.00	60.00	U	V	UHSU
09691	GW02904IT	5/22/92	ANTIMONY	18.00	60.00	U	V	UHSU
09691	GW03458IT	8/31/92	ANTIMONY	18.80	18.80	U	V	UHSU
09691	GW03865IT	11/17/92	ANTIMONY	33.00	60.00	U	V	UHSU
0987	GW01667IT	8/16/91	ANTIMONY	66.90	60.00	U	JA	UHSU
0987	GW02088IT	12/16/91	ANTIMONY	30.40	60.00	B	V	UHSU
0987	GW02402IT	3/6/92	ANTIMONY	8.00	60.00	UN	JA	UHSU
0987	GW02942IT	5/26/92	ANTIMONY	18.00	60.00	U	V	UHSU
0987	GW03179IT	7/16/92	ANTIMONY	20.00	60.00	U	V	UHSU
0987	GW03708IT	12/10/92	ANTIMONY	14.00	60.00	U	V	UHSU
10991	GW02436IT	2/6/92	ANTIMONY	17.30	60.00	B	JA	UHSU
10991	GW02943IT	5/22/92	ANTIMONY	18.00	60.00	U	V	UHSU
10991	GW03289IT	7/28/92	ANTIMONY	20.00	60.00	U	V	UHSU
10991	GW03728IT	10/23/92	ANTIMONY	24.40	24.40	U	V	UHSU
11491	GW02886IT	5/28/92	ANTIMONY	18.00	60.00	U	V	UHSU
11691	GW03011IT	6/8/92	ANTIMONY	18.00	60.00	UN	JA	UHSU
11691	GW03127IT	7/10/92	ANTIMONY	20.00	60.00	U	V	UHSU
11791	GW02432IT	2/6/92	ANTIMONY	8.00	60.00	U	V	UHSU
11791	GW02917IT	5/20/92	ANTIMONY	18.00	60.00	U	V	UHSU
11791	GW03465IT	9/8/92	ANTIMONY	42.40	18.80		JA	UHSU
11791	GW03890IT	11/11/92	ANTIMONY	30.00	60.00	U	V	UHSU
11791	GW03891IT	11/12/92	ANTIMONY	33.00	60.00	U	V	UHSU
1187	GW01648IT	9/6/91	ANTIMONY	50.00	60.00	U	V	UHSU
1187	GW02004IT	11/21/91	ANTIMONY	61.80	60.00	U	JA	UHSU
1187	GW03460IT	9/1/92	ANTIMONY	17.00	60.00	U	V	UHSU

TABLE D-2
UNFILTERED ANTIMONY IN UHSU GROUNDWATER

location	fieldid	date_sampled	Analyte	RESULT (µg/l)	REP_LIM	qual_lab	qual_wc	location_z
11891	GW02117IT	12/19/91	ANTIMONY	297.00	60.00		JA	UHSU
11891	GW02552IT	2/28/92	ANTIMONY	8.00	60.00	U	V	UHSU
11891	GW03012IT	6/2/92	ANTIMONY	18.00	60.00	U	V	UHSU
11891	GW03128IT	7/9/92	ANTIMONY	20.00	60.00	U	V	UHSU
11891	GW03901IT	10/16/92	ANTIMONY	24.40	24.40	U	V	UHSU
12091	GW02116IT	12/19/91	ANTIMONY	50.20	60.00	U	JA	UHSU
12091	GW02514IT	2/27/92	ANTIMONY	8.00	60.00	U	V	UHSU
12091	GW02876IT	5/13/92	ANTIMONY	18.00	60.00	U	JA	UHSU
12091	GW03290IT	7/29/92	ANTIMONY	20.00	60.00	U	V	UHSU
12091	GW03822IT	11/10/92	ANTIMONY	30.00	60.00	U	V	UHSU
12191	GW02862IT	6/3/92	ANTIMONY	18.00	60.00	UN	JA	UHSU
12191	GW03410IT	8/19/92	ANTIMONY	18.90	18.80		JA	UHSU
12191	GW03910IT	10/21/92	ANTIMONY	224.00	122.00		JA	UHSU
12291	GW02607IT	3/17/92	ANTIMONY	18.00	60.00	U	V	UHSU
12291	GW02859IT	5/29/92	ANTIMONY	18.00	60.00	U	V	UHSU
12391	GW02887IT	5/14/92	ANTIMONY	18.00	60.00	U	V	UHSU
12391	GW03421IT	9/15/92	ANTIMONY	24.40	24.40	U	V	UHSU
12391	GW03919IT	12/3/92	ANTIMONY	14.00	60.00	U	V	UHSU
12491	GW02888IT	5/14/92	ANTIMONY	18.00	60.00	U	JA	UHSU
12491	GW03422IT	9/14/92	ANTIMONY	32.30	18.80		JA	UHSU
12491	GW03922IT	10/22/92	ANTIMONY	46.40	24.40		JA	UHSU
12691	GW02437IT	2/13/92	ANTIMONY	8.70	60.00	BN	JA	UHSU
12691	GW02889IT	5/29/92	ANTIMONY	18.00	60.00	U	V	UHSU
12691	GW03423IT	9/10/92	ANTIMONY	23.90	18.80		JA	UHSU
12691	GW03923IT	10/23/92	ANTIMONY	24.40	24.40	U	V	UHSU
1287	GW01647IT	9/9/91	ANTIMONY	50.00	60.00	U	V	UHSU
1287	GW02921IT	5/18/92	ANTIMONY	18.00	60.00	U	V	UHSU
12991	GW02601IT	3/17/92	ANTIMONY	18.00	60.00	U	V	UHSU
12991	GW02911IT	5/22/92	ANTIMONY	18.00	60.00	U	V	UHSU
12991	GW03437IT	8/28/92	ANTIMONY	62.60	37.60		JA	UHSU
12991	GW03867IT	11/30/92	ANTIMONY	33.00	17.00	U	V	UHSU
13091	GW02912IT	5/22/92	ANTIMONY	18.00	60.00	U	V	UHSU
13091	GW03440IT	9/9/92	ANTIMONY	18.80	18.80	U	V	UHSU
13191	GW02905IT	5/19/92	ANTIMONY	18.00	60.00	U	V	UHSU
13191	GW03433IT	9/2/92	ANTIMONY	18.80	18.80	U	V	UHSU
13191	GW03855IT	11/17/92	ANTIMONY	33.00	60.00	U	V	UHSU
13391	GW03016IT	6/8/92	ANTIMONY	18.00	60.00	UN	JA	UHSU
13391	GW03354IT	8/20/92	ANTIMONY	18.80	18.80	U	V	UHSU
13391	GW03906IT	10/20/92	ANTIMONY	24.40	24.40	U	V	UHSU
13491	GW03063IT	6/24/92	ANTIMONY	18.00	60.00	U	V	UHSU
13491	GW03411IT	8/21/92	ANTIMONY	70.80	18.80		JA	UHSU
13491	GW03928IT	10/22/92	ANTIMONY	79.10	24.40		JA	UHSU
1487	GW01646IT	9/5/91	ANTIMONY	50.00	60.00	U	V	UHSU
1487	GW02003IT	11/21/91	ANTIMONY	19.10	60.00	B		UHSU
1487	GW02388IT	2/21/92	ANTIMONY	8.00	60.00	U	V	UHSU
1487	GW02922IT	5/20/92	ANTIMONY	18.00	60.00	U	V	UHSU
1487	GW03461IT	8/31/92	ANTIMONY	17.00	60.00	U	V	UHSU
1587	GW01650IT	9/4/91	ANTIMONY	56.50	60.00	B	V	UHSU
1587	GW02005IT	12/18/91	ANTIMONY	38.20	60.00	U	JA	UHSU
1587	GW02914IT	6/23/92	ANTIMONY	24.50	60.00	U	JA	UHSU
1587	GW03442IT	9/1/92	ANTIMONY	17.00	60.00	U	V	UHSU
1787	GW01687IT	8/19/91	ANTIMONY	45.00	60.00	U	JA	UHSU
1787	GW02031IT	11/18/91	ANTIMONY	59.80	60.00	U	JA	UHSU
1787	GW02424IT	2/24/92	ANTIMONY	9.20	60.00	B	V	UHSU
1787	GW02844IT	4/30/92	ANTIMONY	18.00	60.00	UN	JA	UHSU
1787	GW03281IT	7/29/92	ANTIMONY	20.00	60.00	U	V	UHSU
1787	GW03823IT	11/10/92	ANTIMONY	33.00	60.00	U	V	UHSU

TABLE D-2
UNFILTERED ANTIMONY IN UHSU GROUNDWATER

location	fieldid	date_sampled	Analyte	RESULT (µg/l)	REP_LIM	qual_lab	qual_wc	location_z
2387	GW01669IT	8/19/91	ANTIMONY	51.40	60.00	U	JA	UHSU
2387	GW02032IT	11/23/91	ANTIMONY	75.10	60.00	U	JA	UHSU
2387	GW02405IT	2/28/92	ANTIMONY	8.00	60.00	U	V	UHSU
2387	GW02845IT	5/28/92	ANTIMONY	18.00	60.00	U	V	UHSU
2387	GW03256IT	7/30/92	ANTIMONY	20.00	60.00	U	V	UHSU
2387	GW03816IT	11/6/92	ANTIMONY	30.00	60.00	U	V	UHSU
2587	GW01685IT	9/10/91	ANTIMONY	50.00	60.00	U	V	UHSU
2587	GW02039IT	11/18/91	ANTIMONY	64.40	60.00	U	JA	UHSU
2587	GW02406IT	3/3/92	ANTIMONY	8.00	60.00	U	JA	UHSU
2587	GW02865IT	5/15/92	ANTIMONY	18.00	60.00	U	V	UHSU
2587	GW03348IT	9/22/92	ANTIMONY	33.00	60.00	U	V	UHSU
2587	GW03912IT	10/27/92	ANTIMONY	33.00	60.00	U	V	UHSU
2987	GW01703IT	8/21/91	ANTIMONY	56.00	60.00	B	V	UHSU
2987	GW02080IT	12/7/91	ANTIMONY	33.20	60.00	B	JA	UHSU
2987	GW02412IT	2/12/92	ANTIMONY	8.30	60.00	U	JA	UHSU
2987	GW03058IT	6/9/92	ANTIMONY	18.00	60.00	U	V	UHSU
2987	GW03292IT	7/31/92	ANTIMONY	18.60	60.00	U	JA	UHSU
2987	GW03730IT	10/27/92	ANTIMONY	33.00	60.00	U	V	UHSU
3287	GW01642IT	9/4/91	ANTIMONY	57.30	60.00	B	V	UHSU
3287	GW02012IT	11/22/91	ANTIMONY	67.90	60.00	U	JA	UHSU
3287	GW02429IT	2/25/92	ANTIMONY	10.40	60.00	B	JA	UHSU
3287	GW02936IT	5/18/92	ANTIMONY	18.00	60.00	U	V	UHSU
3287	GW03447IT	9/9/92	ANTIMONY	17.00	60.00	U	V	UHSU
3287	GW03880IT	11/30/92	ANTIMONY	33.00	17.00	U	V	UHSU
34791	GW02157IT	12/17/91	ANTIMONY	50.00	60.00	U	JA	UHSU
34791	GW02447IT	2/10/92	ANTIMONY	8.00	60.00	U	JA	UHSU
34791	GW02908IT	5/20/92	ANTIMONY	18.00	60.00	U	V	UHSU
34791	GW03459IT	9/2/92	ANTIMONY	43.80	18.80		JA	UHSU
34791	GW03863IT	11/16/92	ANTIMONY	33.00	60.00	U	V	UHSU
3586	GW01818IT	10/8/91	ANTIMONY	32.00	60.00	U	JA	UHSU
3586	GW02195IT	1/10/92	ANTIMONY	8.00	60.00	U	JA	UHSU
3586	GW02631IT	4/7/92	ANTIMONY	18.00	60.00	U	V	UHSU
3586	GW03217IT	8/5/92	ANTIMONY	17.00	60.00	U	V	UHSU
3586	GW03828IT	12/10/92	ANTIMONY	14.00	60.00	U	V	UHSU
3687	GW01674IT	8/23/91	ANTIMONY	27.60	60.00	B	V	UHSU
3687	GW02036IT	11/25/91	ANTIMONY	59.30	60.00	U	JA	UHSU
3687	GW02414IT	3/5/92	ANTIMONY	8.00	60.00	UN	JA	UHSU
3687	GW02852IT	5/15/92	ANTIMONY	18.00	60.00	U	V	UHSU
3687	GW03384IT	8/17/92	ANTIMONY	17.00	60.00	U	V	UHSU
3687	GW03924IT	10/27/92	ANTIMONY	33.00	60.00	U	V	UHSU
3986	GW01592IT	8/16/91	ANTIMONY	45.10	60.00	U	JA	UHSU
3986	GW02049IT	12/5/91	ANTIMONY	57.10	60.00	U	JA	UHSU
3986	GW02241IT	1/21/92	ANTIMONY	8.00	60.00	U	V	UHSU
3986	GW03328IT	9/8/92	ANTIMONY	17.00	60.00	U	V	UHSU
3986	GW03893IT	10/19/92	ANTIMONY	33.00	60.00	U	V	UHSU
41591	GW02091IT	12/6/91	ANTIMONY	53.40	60.00	B	V	UHSU
41591	GW02952IT	6/10/92	ANTIMONY	19.80	19.80	U	V	UHSU
41591	GW03395IT	9/15/92	ANTIMONY	24.40	24.40	U	V	UHSU
41591	GW03811IT	11/17/92	ANTIMONY	33.00	60.00	U	V	UHSU
41691	GW02090IT	12/7/91	ANTIMONY	194.00	60.00		JA	UHSU
41691	GW02953IT	6/11/92	ANTIMONY	33.80	19.80		V	UHSU
41691	GW03396IT	9/16/92	ANTIMONY	24.40	24.40	U	V	UHSU
41691	GW03806IT	11/18/92	ANTIMONY	14.00	60.00	U	V	UHSU
4286	GW01706IT	9/11/91	ANTIMONY	50.00	60.00	U	V	UHSU
4286	GW02044IT	12/4/91	ANTIMONY	65.80	60.00		JA	UHSU
4286	GW02398IT	2/10/92	ANTIMONY	8.00	60.00	U	V	UHSU
4286	GW02846IT	5/29/92	ANTIMONY	18.00	60.00	U	V	UHSU

TABLE D-2
UNFILTERED ANTIMONY IN UHSU GROUNDWATER

location	fieldid	date_sampled	Analyte	RESULT (µg/l)	REP_LIM	qual_lab	qual_wc	location_z
4286	GW03385IT	8/17/92	ANTIMONY	17.00	60.00	U	V	UHSU
4286	GW03925IT	11/30/92	ANTIMONY	33.00	17.00	U	V	UHSU
6286	GW01708IT	8/22/91	ANTIMONY	20.80	60.00	B	V	UHSU
6286	GW02046IT	11/25/91	ANTIMONY	40.60	60.00	U	JA	UHSU
6286	GW03056IT	6/11/92	ANTIMONY	19.80	19.80	U	V	UHSU
6286	GW03294IT	7/31/92	ANTIMONY	20.00	60.00	U	JA	UHSU
6286	GW03885IT	11/9/92	ANTIMONY	33.00	60.00	U	V	UHSU
6586	GW01671IT	8/16/91	ANTIMONY	50.40	60.00	U	JA	UHSU
6586	GW02050IT	12/6/91	ANTIMONY	16.00	60.00	B	JA	UHSU
6586	GW02326IT	1/23/92	ANTIMONY	8.00	60.00	U		UHSU
6586	GW02840IT	4/30/92	ANTIMONY	18.00	60.00	UN	JA	UHSU
6586	GW03308IT	8/6/92	ANTIMONY	17.00	60.00	U	V	UHSU
6586	GW03947IT	12/14/92	ANTIMONY	31.00	17.00	U	V	UHSU
B218789	GW01673IT	20-Aug-91	ANTIMONY	35.60	60.00	U	JA	UHSU
B218789	GW02034IT	19-Nov-91	ANTIMONY	41.30	60.00	B		UHSU
B218789	GW02419IT	18-Feb-92	ANTIMONY	8.00	60.00	U	JA	UHSU
B218789	GW02866IT	8-May-92	ANTIMONY	18.00	60.00	UN	JA	UHSU
B218789	GW03349IT	21-Aug-92	ANTIMONY	18.80	18.80	U	V	UHSU
B218789	GW03913IT	27-Oct-92	ANTIMONY	33.00	60.00	U	V	UHSU

TABLE D-3
UNFILTERED BERYLLIUM IN UHSU GROUNDWATER

location	fieldid	date_sampled	Analyte	RESULT (µg/l)	REP_LIM	qual_lab	qual_wc	location_z
00191	GW02596IT	3/16/92	BERYLLIUM	1.00	5.00	U	V	UHSU
00191	GW02909IT	5/21/92	BERYLLIUM	1.00	5.00	U	V	UHSU
00191	GW03435IT	9/1/92	BERYLLIUM	0.60	0.60		JA	UHSU
00191	GW03861IT	11/18/92	BERYLLIUM	24.30	5.00		V	UHSU
00291	GW02581IT	3/11/92	BERYLLIUM	1.00	5.00	U	V	UHSU
00291	GW02910IT	5/21/92	BERYLLIUM	1.70	5.00	B	V	UHSU
00291	GW03436IT	9/8/92	BERYLLIUM	8.70	0.60		V	UHSU
00291	GW03868IT	11/30/92	BERYLLIUM	1.60	1.00		V	UHSU
00391	GW02158IT	12/17/91	BERYLLIUM	1.10	5.00	B	V	UHSU
00391	GW02526IT	2/28/92	BERYLLIUM	1.00	5.00	U	V	UHSU
00391	GW02915IT	5/21/92	BERYLLIUM	1.00	5.00	U	V	UHSU
00391	GW03453IT	9/8/92	BERYLLIUM	0.70	0.60		JA	UHSU
00391	GW03888IT	11/11/92	BERYLLIUM	1.00	5.00	U	V	UHSU
00491	GW02159IT	12/18/91	BERYLLIUM	1.70	5.00	U	JA	UHSU
00491	GW02527IT	2/28/92	BERYLLIUM	1.00	5.00	U	V	UHSU
00491	GW02916IT	5/20/92	BERYLLIUM	1.10	5.00	B	V	UHSU
00491	GW03462IT	9/1/92	BERYLLIUM	0.60	0.60	U	V	UHSU
00491	GW03889IT	11/9/92	BERYLLIUM	1.00	5.00	U	V	UHSU
01391	GW03259IT	7/30/92	BERYLLIUM	3.00	5.00	U	V	UHSU
01491	GW02597IT	3/18/92	BERYLLIUM	14.60	5.00		V	UHSU
01491	GW02858IT	5/15/92	BERYLLIUM	1.10	5.00	B	V	UHSU
01491	GW03260IT	7/30/92	BERYLLIUM	15.30	5.00		V	UHSU
01491	GW03814IT	11/19/92	BERYLLIUM	7.30	5.00		V	UHSU
01791	GW02173IT	12/19/91	BERYLLIUM	11.90	5.00		V	UHSU
01791	GW02598IT	3/17/92	BERYLLIUM	6.40	5.00		V	UHSU
01791	GW02871IT	5/14/92	BERYLLIUM	1.30	5.00	B	V	UHSU
01791	GW03283IT	8/3/92	BERYLLIUM	3.80	0.60		JA	UHSU
01791	GW03817IT	11/5/92	BERYLLIUM	1.30	5.00	U	JA	UHSU
01891	GW02178IT	12/23/91	BERYLLIUM	1.60	5.00	U	JA	UHSU
01891	GW02509IT	2/27/92	BERYLLIUM	1.00	5.00	U	V	UHSU
01891	GW02872IT	5/13/92	BERYLLIUM	1.30	5.00	B	V	UHSU
01891	GW03284IT	7/29/92	BERYLLIUM	3.10	5.00	B	V	UHSU
01991	GW02853IT	6/4/92	BERYLLIUM	1.50	5.00	B	V	UHSU
01991	GW03350IT	9/14/92	BERYLLIUM	2.20	0.60		JA	UHSU
01991	GW03907IT	10/23/92	BERYLLIUM	0.80	0.80	U	V	UHSU
02091	GW02138IT	12/14/91	BERYLLIUM	3.80	5.00	B	JA	UHSU
02091	GW02510IT	2/26/92	BERYLLIUM	1.00	5.00	U	V	UHSU
02091	GW02873IT	5/15/92	BERYLLIUM	1.30	5.00	B	V	UHSU
02091	GW03285IT	7/31/92	BERYLLIUM	1.90	5.00	UB	V	UHSU
02091	GW03819IT	11/6/92	BERYLLIUM	4.30	5.00	B	V	UHSU
02291	GW02113IT	12/16/91	BERYLLIUM	3.00	5.00	B	JA	UHSU
02291	GW02511IT	2/26/92	BERYLLIUM	1.30	5.00	B	V	UHSU
02291	GW02874IT	5/14/92	BERYLLIUM	1.30	5.00	B	V	UHSU
02291	GW03286IT	7/31/92	BERYLLIUM	1.80	5.00	UB	V	UHSU
02291	GW03820IT	10/29/92	BERYLLIUM	4.50	0.80		JA	UHSU
02491	GW02114IT	12/16/91	BERYLLIUM	1.30	5.00	B	JA	UHSU
02491	GW02572IT	3/11/92	BERYLLIUM	1.00	5.00	U	V	UHSU
02491	GW02875IT	5/15/92	BERYLLIUM	1.00	5.00	U	V	UHSU
02491	GW03287IT	7/31/92	BERYLLIUM	1.00	5.00	U	V	UHSU
02591	GW03015IT	6/9/92	BERYLLIUM	2.00	5.00	U	JA	UHSU
02591	GW03314IT	8/11/92	BERYLLIUM	0.60	0.60	U	V	UHSU
02591	GW03904IT	10/20/92	BERYLLIUM	0.80	0.80	U	V	UHSU
02861	GW02611IT	3/18/92	BERYLLIUM	1.00	5.00	U	V	UHSU
02861	GW02955IT	6/10/92	BERYLLIUM	0.60	0.60		JA	UHSU
02991	GW02441IT	3/12/92	BERYLLIUM	1.00	5.00	U	V	UHSU
02991	GW02854IT	5/8/92	BERYLLIUM	1.00	5.00	U	V	UHSU
02991	GW03351IT	8/21/92	BERYLLIUM	0.60	0.60	U	V	UHSU

TABLE D-3
UNFILTERED BERYLLIUM IN UHSU GROUNDWATER

location	fieldid	date_sampled	Analyte	RESULT (µg/l)	REP_LIM	qual_lab	qual_wc	location_z
02991	GW03908IT	10/20/92	BERYLLIUM	0.80	0.80	U	V	UHSU
03091	GW02134IT	12/14/91	BERYLLIUM	3.20	5.00	B	JA	UHSU
03091	GW02568IT	3/5/92	BERYLLIUM	1.00	5.00	U	V	UHSU
03091	GW02881IT	5/12/92	BERYLLIUM	1.00	5.00	U	V	UHSU
03091	GW03914IT	10/22/92	BERYLLIUM	1.90	0.80		JA	UHSU
03191	GW02156IT	12/19/91	BERYLLIUM	1.00	5.00	U	V	UHSU
03191	GW02882IT	5/12/92	BERYLLIUM	1.00	5.00	U	V	UHSU
03391	GW02092IT	12/5/91	BERYLLIUM	7.50	5.00		V	UHSU
03391	GW02547IT	3/13/92	BERYLLIUM	1.00	5.00	U	V	UHSU
03391	GW03006IT	6/2/92	BERYLLIUM	6.10	5.00		V	UHSU
03391	GW03123IT	7/9/92	BERYLLIUM	3.00	5.00	U	V	UHSU
03391	GW03896IT	10/16/92	BERYLLIUM	1.90	0.80		JA	UHSU
03591	GW02161IT	12/19/91	BERYLLIUM	3.10	5.00	U	JA	UHSU
03591	GW02883IT	6/4/92	BERYLLIUM	1.70	5.00	B	V	UHSU
03591	GW03387IT	8/13/92	BERYLLIUM	1.20	0.60		JA	UHSU
03691	GW03048IT	6/8/92	BERYLLIUM	8.70	5.00		JA	UHSU
03691	GW03124IT	7/8/92	BERYLLIUM	3.00	5.00	U	V	UHSU
03691	GW03897IT	10/21/92	BERYLLIUM	19.00	0.80		V	UHSU
03791	GW02093IT	12/6/91	BERYLLIUM	6.60	5.00		V	UHSU
03791	GW02557IT	3/19/92	BERYLLIUM	12.50	5.00		V	UHSU
03791	GW03007IT	6/10/92	BERYLLIUM	1.40	0.60		JA	UHSU
03791	GW03125IT	7/10/92	BERYLLIUM	3.00	5.00	U	V	UHSU
03791	GW03898IT	10/16/92	BERYLLIUM	1.50	0.80		JA	UHSU
0386	GW01762IT	9/11/91	BERYLLIUM	2.00	5.00	U	V	UHSU
0386	GW02026IT	11/13/91	BERYLLIUM	1.00	5.00	U		UHSU
0386	GW02612IT	4/1/92	BERYLLIUM	1.00	5.00	U	V	UHSU
0386	GW02956IT	6/12/92	BERYLLIUM	0.60	0.60	U	V	UHSU
0386	GW03392IT	9/16/92	BERYLLIUM	1.00	5.00	U	V	UHSU
0386	GW03810IT	11/17/92	BERYLLIUM	1.00	5.00	U	V	UHSU
03991	GW03010IT	6/23/92	BERYLLIUM	73.00	5.00		V	UHSU
03991	GW03126IT	7/8/92	BERYLLIUM	19.90	5.00		V	UHSU
03991	GW03899IT	10/21/92	BERYLLIUM	108.00	4.00		V	UHSU
04191	GW02923IT	5/19/92	BERYLLIUM	1.10	5.00	B	V	UHSU
04291	GW02924IT	5/19/92	BERYLLIUM	1.00	5.00	U	V	UHSU
04591	GW02175IT	12/20/91	BERYLLIUM	2.60	5.00	U	JA	UHSU
04591	GW02525IT	3/3/92	BERYLLIUM	1.00	5.00	U	V	UHSU
04591	GW02931IT	5/22/92	BERYLLIUM	1.80	5.00	B	V	UHSU
04591	GW03450IT	8/31/92	BERYLLIUM	0.60	0.60		JA	UHSU
04591	GW03882IT	12/8/92	BERYLLIUM	1.00	1.00	U	V	UHSU
04991	GW02939IT	5/21/92	BERYLLIUM	1.90	5.00	B	V	UHSU
04991	GW03236IT	7/27/92	BERYLLIUM	3.10	5.00	B	V	UHSU
05091	GW02177IT	12/23/91	BERYLLIUM	1.30	5.00	U	JA	UHSU
05091	GW02619IT	3/26/92	BERYLLIUM	1.00	5.00	U	V	UHSU
05091	GW02940IT	5/20/92	BERYLLIUM	1.10	5.00	B	V	UHSU
05091	GW03237IT	7/28/92	BERYLLIUM	3.00	5.00	U	V	UHSU
05091	GW03726IT	10/28/92	BERYLLIUM	1.70	5.00	B	V	UHSU
05191	GW02160IT	12/17/91	BERYLLIUM	11.00	5.00		V	UHSU
05191	GW02571IT	3/5/92	BERYLLIUM	1.00	5.00	U	V	UHSU
05191	GW02941IT	5/21/92	BERYLLIUM	1.80	5.00	B	V	UHSU
05191	GW03238IT	7/24/92	BERYLLIUM	3.00	5.00	U	V	UHSU
05191	GW03727IT	10/28/92	BERYLLIUM	4.40	5.00	B	V	UHSU
05391	GW02084IT	12/5/91	BERYLLIUM	1.00	5.00	U	V	UHSU
05391	GW02566IT	3/5/92	BERYLLIUM	1.00	5.00	U	V	UHSU
05391	GW02884IT	6/11/92	BERYLLIUM	1.60	0.60		JA	UHSU
05391	GW03388IT	9/10/92	BERYLLIUM	0.60	0.60	U	V	UHSU
05391	GW03917IT	10/28/92	BERYLLIUM	1.00	5.00	U	V	UHSU
05691	GW02061IT	12/4/91	BERYLLIUM	14.40	5.00		V	UHSU

TABLE D-3
UNFILTERED BERYLLIUM IN UHSU GROUNDWATER

location	fieldid	date_sampled	Analyte	RESULT (µg/l)	REP_LIM	qual_lab	qual_wc	location_z
05691	GW02549IT	3/12/92	BERYLLIUM	2.50	5.00	B	V	UHSU
05691	GW02885IT	5/28/92	BERYLLIUM	1.00	5.00	U	JA	UHSU
05691	GW03389IT	8/21/92	BERYLLIUM	8.90	0.60		V	UHSU
05691	GW03918IT	11/9/92	BERYLLIUM	45.70	5.00		V	UHSU
06091	GW02062IT	12/4/91	BERYLLIUM	4.90	5.00	B	V	UHSU
06091	GW02576IT	3/12/92	BERYLLIUM	2.70	5.00	B	V	UHSU
06091	GW03014IT	6/11/92	BERYLLIUM	2.30	0.60		JA	UHSU
06091	GW03318IT	8/6/92	BERYLLIUM	3.00	0.60		JA	UHSU
06091	GW03903IT	10/19/92	BERYLLIUM	0.80	0.80		JA	UHSU
06191	GW03352IT	8/14/92	BERYLLIUM	0.70	0.60		JA	UHSU
06491	GW02616IT	4/1/92	BERYLLIUM	1.00	5.00	U	V	UHSU
06491	GW03049IT	6/22/92	BERYLLIUM	1.00	5.00	B	V	UHSU
06491	GW03375IT	9/10/92	BERYLLIUM	0.60	0.60	U	V	UHSU
06591	GW02895IT	5/19/92	BERYLLIUM	1.00	5.00	U	V	UHSU
06591	GW03427IT	8/27/92	BERYLLIUM	3.80	0.60		JA	UHSU
06591	GW03847IT	11/17/92	BERYLLIUM	1.80	5.00	U	V	UHSU
06691	GW02896IT	5/18/92	BERYLLIUM	1.10	5.00	B	V	UHSU
06791	GW02897IT	5/20/92	BERYLLIUM	1.00	5.00	B	V	UHSU
06891	GW02898IT	5/20/92	BERYLLIUM	1.00	5.00	U	V	UHSU
06891	GW03429IT	8/26/92	BERYLLIUM	0.60	0.60	U	JA	UHSU
06891	GW03851IT	11/18/92	BERYLLIUM	1.00	5.00	U	V	UHSU
06991	GW02899IT	5/18/92	BERYLLIUM	34.00	5.00		V	UHSU
06991	GW03430IT	8/26/92	BERYLLIUM	2.00	0.60		JA	UHSU
06991	GW03850IT	11/18/92	BERYLLIUM	5.20	5.00		V	UHSU
07191	GW02900IT	5/18/92	BERYLLIUM	5.20	5.00		V	UHSU
07191	GW03455IT	8/27/92	BERYLLIUM	5.50	0.60		JA	UHSU
07391	GW02902IT	5/21/92	BERYLLIUM	1.90	5.00	B	V	UHSU
07391	GW03457IT	8/28/92	BERYLLIUM	0.60	0.60	U	V	UHSU
07391	GW03862IT	11/16/92	BERYLLIUM	1.40	5.00	U	JA	UHSU
07891	GW02434IT	3/12/92	BERYLLIUM	1.00	5.00	U	V	UHSU
07891	GW02855IT	5/7/92	BERYLLIUM	1.50	5.00	U	JA	UHSU
07891	GW03353IT	8/20/92	BERYLLIUM	1.40	0.60		JA	UHSU
07891	GW03909IT	10/23/92	BERYLLIUM	1.40	0.80		JA	UHSU
07991	GW02925IT	5/20/92	BERYLLIUM	1.00	5.00	B	V	UHSU
07991	GW03322IT	8/26/92	BERYLLIUM	0.60	0.60	U	JA	UHSU
08891	GW03065IT	6/23/92	BERYLLIUM	2.20	5.00	B	V	UHSU
08891	GW03431IT	8/31/92	BERYLLIUM	2.10	0.60		JA	UHSU
08891	GW03849IT	11/17/92	BERYLLIUM	1.00	5.00	U	V	UHSU
09091	GW02903IT	5/20/92	BERYLLIUM	35.80	5.00		V	UHSU
09091	GW03432IT	8/31/92	BERYLLIUM	5.60	0.60		JA	UHSU
09091	GW03852IT	11/18/92	BERYLLIUM	1.00	5.00	U	V	UHSU
09691	GW02608IT	3/18/92	BERYLLIUM	1.00	5.00	U	V	UHSU
09691	GW02904IT	5/22/92	BERYLLIUM	1.90	5.00	B	V	UHSU
09691	GW03458IT	8/31/92	BERYLLIUM	0.60	0.60	U	V	UHSU
09691	GW03865IT	11/17/92	BERYLLIUM	1.10	5.00	U	V	UHSU
0987	GW01667IT	8/16/91	BERYLLIUM	1.40	5.00	B	JA	UHSU
0987	GW02088IT	12/16/91	BERYLLIUM	1.00	5.00	U	JA	UHSU
0987	GW02402IT	3/6/92	BERYLLIUM	1.00	5.00	U	V	UHSU
0987	GW02942IT	5/26/92	BERYLLIUM	1.70	5.00	B	V	UHSU
0987	GW03179IT	7/16/92	BERYLLIUM	3.00	5.00	U	V	UHSU
0987	GW03708IT	12/10/92	BERYLLIUM	1.00	5.00	U	V	UHSU
10991	GW02436IT	2/6/92	BERYLLIUM	13.80	5.00		V	UHSU
10991	GW02943IT	5/22/92	BERYLLIUM	11.90	5.00		V	UHSU
10991	GW03289IT	7/28/92	BERYLLIUM	3.00	5.00	U	V	UHSU
10991	GW03728IT	10/23/92	BERYLLIUM	1.40	0.80		JA	UHSU
11491	GW02886IT	5/28/92	BERYLLIUM	1.10	5.00	U	JA	UHSU
11691	GW03011IT	6/8/92	BERYLLIUM	1.70	5.00	B	V	UHSU

TABLE D-3
UNFILTERED BERYLLIUM IN UHSU GROUNDWATER

location	fieldid	date_sampled	Analyte	RESULT (µg/l)	REP_LIM	qual_lab	qual_wc	location_z
11691	GW03127IT	7/10/92	BERYLLIUM	3.00	5.00	U	V	UHSU
11791	GW02432IT	2/6/92	BERYLLIUM	3.90	5.00	B	V	UHSU
11791	GW02917IT	5/20/92	BERYLLIUM	1.00	5.00	B	V	UHSU
11791	GW03465IT	9/8/92	BERYLLIUM	2.40	0.60		JA	UHSU
11791	GW03890IT	11/11/92	BERYLLIUM	1.00	5.00	U	V	UHSU
11791	GW03891IT	11/12/92	BERYLLIUM	1.00	5.00	U	V	UHSU
1187	GW01648IT	9/6/91	BERYLLIUM	2.00	5.00	U	V	UHSU
1187	GW02004IT	11/21/91	BERYLLIUM	1.00	5.00	U	V	UHSU
1187	GW03460IT	9/1/92	BERYLLIUM	1.00	5.00	U	V	UHSU
11891	GW02117IT	12/19/91	BERYLLIUM	18.70	5.00		V	UHSU
11891	GW02552IT	2/28/92	BERYLLIUM	3.80	5.00	B	V	UHSU
11891	GW03012IT	6/2/92	BERYLLIUM	2.20	5.00	B	V	UHSU
11891	GW03128IT	7/9/92	BERYLLIUM	3.00	5.00	U	V	UHSU
11891	GW03901IT	10/16/92	BERYLLIUM	2.60	0.80		JA	UHSU
12091	GW02116IT	12/19/91	BERYLLIUM	1.90	5.00	U	JA	UHSU
12091	GW02514IT	2/27/92	BERYLLIUM	1.00	5.00	U	V	UHSU
12091	GW02876IT	5/13/92	BERYLLIUM	1.20	5.00	B	V	UHSU
12091	GW03290IT	7/29/92	BERYLLIUM	3.10	5.00	B	V	UHSU
12091	GW03822IT	11/10/92	BERYLLIUM	1.40	5.00	U	JA	UHSU
12191	GW02440IT	3/16/92	BERYLLIUM	8.10	5.00		JA	UHSU
12191	GW02862IT	6/3/92	BERYLLIUM	1.40	5.00	B	V	UHSU
12191	GW03410IT	8/19/92	BERYLLIUM	1.60	0.60		JA	UHSU
12191	GW03910IT	10/21/92	BERYLLIUM	114.00	4.00		V	UHSU
12291	GW02607IT	3/17/92	BERYLLIUM	1.00	5.00	U	V	UHSU
12291	GW02859IT	5/29/92	BERYLLIUM	1.10	5.00	U	JA	UHSU
12391	GW02438IT	2/12/92	BERYLLIUM	7.00	5.00		V	UHSU
12391	GW02887IT	5/14/92	BERYLLIUM	1.20	5.00	B	V	UHSU
12391	GW03421IT	9/15/92	BERYLLIUM	0.90	0.80		JA	UHSU
12391	GW03919IT	12/3/92	BERYLLIUM	1.00	5.00	U	V	UHSU
12491	GW02435IT	2/7/92	BERYLLIUM	25.90	5.00		V	UHSU
12491	GW02888IT	5/14/92	BERYLLIUM	1.00	5.00	B	V	UHSU
12491	GW03422IT	9/14/92	BERYLLIUM	6.30	0.60		JA	UHSU
12491	GW03922IT	10/22/92	BERYLLIUM	13.40	0.80		V	UHSU
12691	GW02437IT	2/13/92	BERYLLIUM	3.00	5.00	B	V	UHSU
12691	GW02889IT	5/29/92	BERYLLIUM	1.10	5.00	U	JA	UHSU
12691	GW03423IT	9/10/92	BERYLLIUM	0.60	0.60	U	V	UHSU
12691	GW03923IT	10/23/92	BERYLLIUM	0.80	0.80	U	V	UHSU
1287	GW01647IT	9/9/91	BERYLLIUM	2.00	5.00	U	V	UHSU
1287	GW02921IT	5/18/92	BERYLLIUM	1.00	5.00	U	V	UHSU
12991	GW02601IT	3/17/92	BERYLLIUM	1.00	5.00	U	V	UHSU
12991	GW02911IT	5/22/92	BERYLLIUM	1.80	5.00	B	V	UHSU
12991	GW03867IT	11/30/92	BERYLLIUM	3.10	1.00		V	UHSU
13091	GW02912IT	5/22/92	BERYLLIUM	1.00	5.00	U	V	UHSU
13091	GW03440IT	9/9/92	BERYLLIUM	0.60	0.60	U	V	UHSU
13191	GW02905IT	5/19/92	BERYLLIUM	1.00	5.00	U	V	UHSU
13191	GW03433IT	9/2/92	BERYLLIUM	0.60	0.60	U	V	UHSU
13191	GW03855IT	11/17/92	BERYLLIUM	1.00	5.00	U	V	UHSU
13391	GW03016IT	6/8/92	BERYLLIUM	1.50	5.00	B	V	UHSU
13391	GW03354IT	8/20/92	BERYLLIUM	2.80	0.60		JA	UHSU
13391	GW03906IT	10/20/92	BERYLLIUM	0.80	0.80	U	V	UHSU
13491	GW03063IT	6/24/92	BERYLLIUM	8.40	5.00		JA	UHSU
13491	GW03411IT	8/21/92	BERYLLIUM	3.10	0.60		JA	UHSU
13491	GW03928IT	10/22/92	BERYLLIUM	31.00	0.80		V	UHSU
1487	GW01646IT	9/5/91	BERYLLIUM	2.00	5.00	U	V	UHSU
1487	GW02003IT	11/21/91	BERYLLIUM	1.00	5.00	U		UHSU
1487	GW02388IT	2/21/92	BERYLLIUM	1.00	5.00	U	V	UHSU
1487	GW02922IT	5/20/92	BERYLLIUM	1.00	5.00	U	V	UHSU

TABLE D-3
UNFILTERED BERYLLIUM IN UHSU GROUNDWATER

location	fieldid	date_sampled	Analyte	RESULT (µg/l)	REP_LIM	qual_lab	qual_wc	location_z
1487	GW03461IT	8/31/92	BERYLLIUM	1.00	5.00	U	V	UHSU
1587	GW01650IT	9/4/91	BERYLLIUM	2.10	5.00	B	V	UHSU
1587	GW02005IT	12/18/91	BERYLLIUM	1.00	5.00	U	V	UHSU
1587	GW02422IT	2/25/92	BERYLLIUM	1.00	5.00	U	V	UHSU
1587	GW02914IT	6/23/92	BERYLLIUM	1.90	5.00	B	V	UHSU
1587	GW03442IT	9/1/92	BERYLLIUM	1.90	5.00	U	V	UHSU
1787	GW01687IT	8/19/91	BERYLLIUM	1.00	5.00	U	V	UHSU
1787	GW02031IT	11/18/91	BERYLLIUM	1.20	5.00	B	V	UHSU
1787	GW02424IT	2/24/92	BERYLLIUM	1.00	5.00	U	V	UHSU
1787	GW02844IT	4/30/92	BERYLLIUM	1.00	5.00	U	V	UHSU
1787	GW03281IT	7/29/92	BERYLLIUM	3.00	5.00	U	V	UHSU
1787	GW03823IT	11/10/92	BERYLLIUM	1.00	5.00	U	V	UHSU
2387	GW01669IT	8/19/91	BERYLLIUM	1.00	5.00	U	V	UHSU
2387	GW02032IT	11/23/91	BERYLLIUM	1.10	5.00	B	V	UHSU
2387	GW02405IT	2/28/92	BERYLLIUM	1.00	5.00	U	V	UHSU
2387	GW02845IT	5/28/92	BERYLLIUM	1.10	5.00	U	JA	UHSU
2387	GW03256IT	7/30/92	BERYLLIUM	3.00	5.00	U	V	UHSU
2387	GW03816IT	11/6/92	BERYLLIUM	1.00	5.00	U	V	UHSU
2587	GW01685IT	9/10/91	BERYLLIUM	2.00	5.00	U	V	UHSU
2587	GW02039IT	11/18/91	BERYLLIUM	1.00	5.00	U	V	UHSU
2587	GW02406IT	3/3/92	BERYLLIUM	1.00	5.00	U	V	UHSU
2587	GW02865IT	5/15/92	BERYLLIUM	1.00	5.00	U	V	UHSU
2587	GW03348IT	9/22/92	BERYLLIUM	1.00	5.00	U	V	UHSU
2587	GW03912IT	10/27/92	BERYLLIUM	1.00	5.00	U	V	UHSU
2987	GW01703IT	8/21/91	BERYLLIUM	1.00	5.00	U	V	UHSU
2987	GW02080IT	12/7/91	BERYLLIUM	1.00	5.00	U	V	UHSU
2987	GW02412IT	2/12/92	BERYLLIUM	1.00	5.00	U	V	UHSU
2987	GW03058IT	6/9/92	BERYLLIUM	2.00	5.00	U	JA	UHSU
2987	GW03292IT	7/31/92	BERYLLIUM	1.10	5.00	UB	V	UHSU
2987	GW03730IT	10/27/92	BERYLLIUM	1.10	5.00	U	V	UHSU
3287	GW01642IT	9/4/91	BERYLLIUM	3.70	5.00	B	V	UHSU
3287	GW02012IT	11/22/91	BERYLLIUM	1.60	5.00	B	V	UHSU
3287	GW02429IT	2/25/92	BERYLLIUM	1.00	5.00	U	V	UHSU
3287	GW02936IT	5/18/92	BERYLLIUM	1.00	5.00	U	V	UHSU
3287	GW03447IT	9/9/92	BERYLLIUM	1.90	5.00	U	V	UHSU
3287	GW03880IT	11/30/92	BERYLLIUM	2.10	1.00		V	UHSU
34791	GW02157IT	12/17/91	BERYLLIUM	1.10	5.00	B	V	UHSU
34791	GW02447IT	2/10/92	BERYLLIUM	1.00	5.00	U	V	UHSU
34791	GW02908IT	5/20/92	BERYLLIUM	1.00	5.00	U	V	UHSU
34791	GW03459IT	9/2/92	BERYLLIUM	0.60	0.60	U	V	UHSU
34791	GW03863IT	11/16/92	BERYLLIUM	1.00	5.00	U	V	UHSU
3586	GW01818IT	10/8/91	BERYLLIUM	1.00	5.00	U	V	UHSU
3586	GW02195IT	1/10/92	BERYLLIUM	1.00	5.00	U	V	UHSU
3586	GW02631IT	4/7/92	BERYLLIUM	1.00	5.00	U	V	UHSU
3586	GW03217IT	8/5/92	BERYLLIUM	1.00	5.00	U	V	UHSU
3586	GW03828IT	12/10/92	BERYLLIUM	1.00	5.00	U	V	UHSU
3687	GW01674IT	8/23/91	BERYLLIUM	1.00	5.00	U	V	UHSU
3687	GW02036IT	11/25/91	BERYLLIUM	1.00	5.00	U	V	UHSU
3687	GW02414IT	3/5/92	BERYLLIUM	1.00	5.00	U	V	UHSU
3687	GW02852IT	5/15/92	BERYLLIUM	1.00	5.00	U	V	UHSU
3687	GW03384IT	8/17/92	BERYLLIUM	1.00	5.00	U	V	UHSU
3687	GW03924IT	10/27/92	BERYLLIUM	1.00	5.00	U	V	UHSU
3986	GW01592IT	8/16/91	BERYLLIUM	1.00	5.00	U	V	UHSU
3986	GW02049IT	12/5/91	BERYLLIUM	1.00	5.00	U	V	UHSU
3986	GW02241IT	1/21/92	BERYLLIUM	1.00	5.00	U	V	UHSU
3986	GW03328IT	9/8/92	BERYLLIUM	1.00	5.00	U	V	UHSU
3986	GW03893IT	10/19/92	BERYLLIUM	1.20	5.00	U	V	UHSU

TABLE D-3
UNFILTERED BERYLLIUM IN UHSU GROUNDWATER

location	fieldid	date_sampled	Analyte	RESULT (µg/l)	REP_LIM	qual_lab	qual_wc	location_z
41591	GW02091IT	12/6/91	BERYLLIUM	2.80	5.00	B	V	UHSU
41591	GW02614IT	3/18/92	BERYLLIUM	1.00	5.00	U	V	UHSU
41591	GW02952IT	6/10/92	BERYLLIUM	3.40	0.60		JA	UHSU
41591	GW03395IT	9/15/92	BERYLLIUM	1.00	0.80		JA	UHSU
41591	GW03811IT	11/17/92	BERYLLIUM	1.00	5.00	U	V	UHSU
41691	GW02090IT	12/7/91	BERYLLIUM	8.90	5.00		JA	UHSU
41691	GW02615IT	4/1/92	BERYLLIUM	1.00	5.00	U	V	UHSU
41691	GW02953IT	6/11/92	BERYLLIUM	3.40	0.60		JA	UHSU
41691	GW03396IT	9/16/92	BERYLLIUM	1.20	0.80		JA	UHSU
41691	GW03806IT	11/18/92	BERYLLIUM	1.20	5.00	B	V	UHSU
4286	GW01706IT	9/11/91	BERYLLIUM	3.50	5.00	B	V	UHSU
4286	GW02044IT	12/4/91	BERYLLIUM	1.00	5.00	U	V	UHSU
4286	GW02398IT	2/10/92	BERYLLIUM	2.60	5.00	B	V	UHSU
4286	GW02846IT	5/29/92	BERYLLIUM	1.00	5.00	U	JA	UHSU
4286	GW03385IT	8/17/92	BERYLLIUM	1.60	5.00	U	V	UHSU
4286	GW03925IT	11/30/92	BERYLLIUM	1.00	1.00	U	V	UHSU
6286	GW01708IT	8/22/91	BERYLLIUM	1.00	5.00	U	V	UHSU
6286	GW02046IT	11/25/91	BERYLLIUM	1.00	5.00	U	V	UHSU
6286	GW02378IT	2/11/92	BERYLLIUM	1.00	5.00	U	V	UHSU
6286	GW03056IT	6/11/92	BERYLLIUM	0.60	0.60	U	V	UHSU
6286	GW03294IT	7/31/92	BERYLLIUM	3.00	5.00	U	V	UHSU
6286	GW03885IT	11/9/92	BERYLLIUM	1.00	5.00	U	V	UHSU
6586	GW01671IT	8/16/91	BERYLLIUM	1.00	5.00	U	V	UHSU
6586	GW02050IT	12/6/91	BERYLLIUM	1.00	5.00	U	V	UHSU
6586	GW02326IT	1/23/92	BERYLLIUM	1.00	5.00	U		UHSU
6586	GW02840IT	4/30/92	BERYLLIUM	1.00	5.00	U	V	UHSU
6586	GW03308IT	8/6/92	BERYLLIUM	1.00	5.00	U	V	UHSU
6586	GW03947IT	12/14/92	BERYLLIUM	1.00	1.00	U	V	UHSU
B218789	GW01673IT	20-Aug-91	BERYLLIUM	1.00	5.00	U	V	UHSU
B218789	GW02034IT	19-Nov-91	BERYLLIUM	1.20	5.00	B		UHSU
B218789	GW02419IT	18-Feb-92	BERYLLIUM	1.00	5.00	U	V	UHSU
B218789	GW02866IT	8-May-92	BERYLLIUM	1.00	5.00	U	V	UHSU
B218789	GW03913IT	27-Oct-92	BERYLLIUM	1.00	5.00	U	V	UHSU

TABLE D-4
UNFILTERED VANADIUM IN UHSU GROUNDWATER

location	fieldid	date_sampled	Analyte	RESULT (µg/l)	REP_LIM	units	qual_lab	qual_wc	location_z
00191	GW02596IT	3/16/92	VANADIUM	7.90	50.00	UG/L	B	V	UHSU
00191	GW02909IT	5/21/92	VANADIUM	11.50	50.00	UG/L	B	V	UHSU
00191	GW03435IT	9/1/92	VANADIUM	8.00	2.90	UG/L		JA	UHSU
00191	GW03861IT	11/18/92	VANADIUM	318.00	50.00	UG/L		V	UHSU
00291	GW02581IT	3/11/92	VANADIUM	60.50	50.00	UG/L		V	UHSU
00291	GW02910IT	5/21/92	VANADIUM	67.40	50.00	UG/L		V	UHSU
00291	GW03436IT	9/8/92	VANADIUM	254.00	2.90	UG/L		V	UHSU
00291	GW03868IT	11/30/92	VANADIUM	40.70	3.00	UG/L		V	UHSU
00391	GW02158IT	12/17/91	VANADIUM	38.90	50.00	UG/L	BE	JA	UHSU
00391	GW02526IT	2/28/92	VANADIUM	14.20	50.00	UG/L	BE	JA	UHSU
00391	GW02915IT	5/21/92	VANADIUM	12.00	50.00	UG/L	B	V	UHSU
00391	GW03453IT	9/8/92	VANADIUM	25.10	2.90	UG/L		V	UHSU
00391	GW03888IT	11/11/92	VANADIUM	21.00	50.00	UG/L	U	JA	UHSU
00491	GW02159IT	12/18/91	VANADIUM	17.10	50.00	UG/L	B	V	UHSU
00491	GW02527IT	2/28/92	VANADIUM	9.00	50.00	UG/L	BE	JA	UHSU
00491	GW02916IT	5/20/92	VANADIUM	11.00	50.00	UG/L	B	V	UHSU
00491	GW03462IT	9/1/92	VANADIUM	2.90	2.90	UG/L	U	JA	UHSU
00491	GW03889IT	11/9/92	VANADIUM	9.80	50.00	UG/L	U	JA	UHSU
01391	GW03259IT	7/30/92	VANADIUM	12.00	50.00	UG/L	B	V	UHSU
01491	GW02597IT	3/18/92	VANADIUM	362.00	50.00	UG/L		V	UHSU
01491	GW02858IT	5/15/92	VANADIUM	16.60	50.00	UG/L	B	V	UHSU
01491	GW03260IT	7/30/92	VANADIUM	171.00	50.00	UG/L		JA	UHSU
01491	GW03814IT	11/19/92	VANADIUM	198.00	50.00	UG/L		V	UHSU
01791	GW02173IT	12/19/91	VANADIUM	251.00	50.00	UG/L		V	UHSU
01791	GW02598IT	3/17/92	VANADIUM	123.00	50.00	UG/L		V	UHSU
01791	GW02871IT	5/14/92	VANADIUM	20.20	50.00	UG/L	B	V	UHSU
01791	GW03283IT	8/3/92	VANADIUM	117.00	2.90	UG/L		V	UHSU
01791	GW03817IT	11/5/92	VANADIUM	34.90	50.00	UG/L	B	V	UHSU
01891	GW02178IT	12/23/91	VANADIUM	15.80	50.00	UG/L	B	V	UHSU
01891	GW02509IT	2/27/92	VANADIUM	17.40	50.00	UG/L	B	V	UHSU
01891	GW02872IT	5/13/92	VANADIUM	20.40	50.00	UG/L	B	V	UHSU
01891	GW03284IT	7/29/92	VANADIUM	26.90	50.00	UG/L	B	V	UHSU
01991	GW02853IT	6/4/92	VANADIUM	64.60	50.00	UG/L		V	UHSU
01991	GW03350IT	9/14/92	VANADIUM	45.70	2.90	UG/L		V	UHSU
01991	GW03907IT	10/23/92	VANADIUM	14.10	3.30	UG/L		V	UHSU
02091	GW02138IT	12/14/91	VANADIUM	40.60	50.00	UG/L	B	V	UHSU
02091	GW02510IT	2/26/92	VANADIUM	21.70	50.00	UG/L	B	V	UHSU
02091	GW02873IT	5/15/92	VANADIUM	18.80	50.00	UG/L	B	V	UHSU
02091	GW03285IT	7/31/92	VANADIUM	15.10	50.00	UG/L	U	JA	UHSU
02091	GW03819IT	11/6/92	VANADIUM	47.50	50.00	UG/L	B	V	UHSU
02291	GW02113IT	12/16/91	VANADIUM	36.30	50.00	UG/L	B	V	UHSU
02291	GW02511IT	2/26/92	VANADIUM	27.30	50.00	UG/L	B	V	UHSU
02291	GW02874IT	5/14/92	VANADIUM	18.40	50.00	UG/L	B	V	UHSU
02291	GW03286IT	7/31/92	VANADIUM	14.50	50.00	UG/L	U	JA	UHSU
02291	GW03820IT	10/29/92	VANADIUM	53.10	3.30	UG/L		V	UHSU
02491	GW02114IT	12/16/91	VANADIUM	14.80	50.00	UG/L	B	V	UHSU
02491	GW02572IT	3/11/92	VANADIUM	7.00	50.00	UG/L	B	V	UHSU
02491	GW02875IT	5/15/92	VANADIUM	7.80	50.00	UG/L	U	JA	UHSU
02491	GW03287IT	7/31/92	VANADIUM	7.70	50.00	UG/L	U	JA	UHSU
02591	GW03015IT	6/9/92	VANADIUM	22.70	50.00	UG/L	B	V	UHSU
02591	GW03314IT	8/11/92	VANADIUM	10.00	2.90	UG/L		JA	UHSU
02591	GW03904IT	10/20/92	VANADIUM	7.80	3.30	UG/L		V	UHSU
0286	GW02611IT	3/18/92	VANADIUM	9.00	50.00	UG/L	B	V	UHSU
0286	GW02955IT	6/10/92	VANADIUM	21.50	3.50	UG/L		V	UHSU
02991	GW02441IT	3/12/92	VANADIUM	45.70	50.00	UG/L	B	V	UHSU
02991	GW02854IT	5/8/92	VANADIUM	59.20	50.00	UG/L		V	UHSU
02991	GW03351IT	8/21/92	VANADIUM	31.60	2.90	UG/L		V	UHSU

TABLE D-4
UNFILTERED VANADIUM IN UHSU GROUNDWATER

location	fieldid	date_sampled	Analyte	RESULT (µg/l)	REP_LIM	units	qual_lab	qual_wc	location_z
02991	GW03908IT	10/20/92	VANADIUM	26.80	3.30	UG/L		V	UHSU
03091	GW02134IT	12/14/91	VANADIUM	40.00	50.00	UG/L	B	V	UHSU
03091	GW02568IT	3/5/92	VANADIUM	34.40	50.00	UG/L	B	V	UHSU
03091	GW02881IT	5/12/92	VANADIUM	14.90	50.00	UG/L	B	V	UHSU
03091	GW03409IT	8/19/92	VANADIUM	25.40	2.90	UG/L		V	UHSU
03091	GW03914IT	10/22/92	VANADIUM	29.80	3.30	UG/L		V	UHSU
03191	GW02156IT	12/19/91	VANADIUM	5.60	50.00	UG/L	U	JA	UHSU
03191	GW02882IT	5/12/92	VANADIUM	14.70	50.00	UG/L	B	V	UHSU
03391	GW02092IT	12/5/91	VANADIUM	111.00	50.00	UG/L		V	UHSU
03391	GW02547IT	3/13/92	VANADIUM	13.90	50.00	UG/L	B	V	UHSU
03391	GW03006IT	6/2/92	VANADIUM	140.00	50.00	UG/L		V	UHSU
03391	GW03123IT	7/9/92	VANADIUM	69.40	50.00	UG/L		V	UHSU
03391	GW03896IT	10/16/92	VANADIUM	55.00	3.30	UG/L		V	UHSU
03591	GW02161IT	12/19/91	VANADIUM	32.10	50.00	UG/L	B	V	UHSU
03591	GW02883IT	6/4/92	VANADIUM	22.30	50.00	UG/L	B	V	UHSU
03591	GW03387IT	8/13/92	VANADIUM	19.90	2.90	UG/L		V	UHSU
03691	GW03048IT	6/8/92	VANADIUM	144.00	50.00	UG/L		V	UHSU
03691	GW03124IT	7/8/92	VANADIUM	70.70	50.00	UG/L		V	UHSU
03691	GW03897IT	10/21/92	VANADIUM	399.00	3.30	UG/L		V	UHSU
03791	GW02093IT	12/6/91	VANADIUM	192.00	50.00	UG/L		V	UHSU
03791	GW02557IT	3/19/92	VANADIUM	289.00	50.00	UG/L		V	UHSU
03791	GW03007IT	6/10/92	VANADIUM	37.80	3.50	UG/L		V	UHSU
03791	GW03125IT	7/10/92	VANADIUM	27.80	50.00	UG/L	B	V	UHSU
03791	GW03898IT	10/16/92	VANADIUM	24.40	3.30	UG/L		V	UHSU
0386	GW01762IT	9/11/91	VANADIUM	10.00	50.00	UG/L	U	V	UHSU
0386	GW02026IT	11/13/91	VANADIUM	7.20	50.00	UG/L	B		UHSU
0386	GW02612IT	4/1/92	VANADIUM	4.20	50.00	UG/L	B	V	UHSU
0386	GW02956IT	6/12/92	VANADIUM	3.50	3.50	UG/L	U	V	UHSU
0386	GW03392IT	9/16/92	VANADIUM	3.00	50.00	UG/L	U	V	UHSU
0386	GW03810IT	11/17/92	VANADIUM	5.00	50.00	UG/L	U	V	UHSU
03991	GW03010IT	6/23/92	VANADIUM	940.00	50.00	UG/L	E	JA	UHSU
03991	GW03126IT	7/8/92	VANADIUM	342.00	50.00	UG/L		V	UHSU
03991	GW03899IT	10/21/92	VANADIUM	1920.00	16.50	UG/L		V	UHSU
04191	GW02923IT	5/19/92	VANADIUM	16.10	50.00	UG/L	B	V	UHSU
04291	GW02924IT	5/19/92	VANADIUM	4.70	50.00	UG/L	U	JA	UHSU
04591	GW02175IT	12/20/91	VANADIUM	81.50	50.00	UG/L		V	UHSU
04591	GW02525IT	3/3/92	VANADIUM	41.90	50.00	UG/L	BE	JA	UHSU
04591	GW02931IT	5/22/92	VANADIUM	42.40	50.00	UG/L	B	V	UHSU
04591	GW03450IT	8/31/92	VANADIUM	20.70	2.90	UG/L		V	UHSU
04591	GW03882IT	12/8/92	VANADIUM	24.10	3.00	UG/L		V	UHSU
04991	GW02939IT	5/21/92	VANADIUM	22.70	50.00	UG/L	B	V	UHSU
04991	GW03236IT	7/27/92	VANADIUM	18.10	50.00	UG/L	B	V	UHSU
05091	GW02177IT	12/23/91	VANADIUM	13.60	50.00	UG/L	B	V	UHSU
05091	GW02619IT	3/26/92	VANADIUM	14.90	50.00	UG/L	B	V	UHSU
05091	GW02940IT	5/20/92	VANADIUM	9.60	50.00	UG/L	B	V	UHSU
05091	GW03237IT	7/28/92	VANADIUM	19.60	50.00	UG/L	B	V	UHSU
05091	GW03726IT	10/28/92	VANADIUM	29.90	50.00	UG/L	B	V	UHSU
05191	GW02160IT	12/17/91	VANADIUM	207.00	50.00	UG/L	E	JA	UHSU
05191	GW02571IT	3/5/92	VANADIUM	17.80	50.00	UG/L	B	V	UHSU
05191	GW02941IT	5/21/92	VANADIUM	48.90	50.00	UG/L	B	V	UHSU
05191	GW03238IT	7/24/92	VANADIUM	89.60	50.00	UG/L		V	UHSU
05191	GW03727IT	10/28/92	VANADIUM	102.00	50.00	UG/L		V	UHSU
05391	GW02084IT	12/5/91	VANADIUM	11.00	50.00	UG/L	B	V	UHSU
05391	GW02566IT	3/5/92	VANADIUM	30.70	50.00	UG/L	B	V	UHSU
05391	GW02884IT	6/11/92	VANADIUM	17.90	3.50	UG/L		JA	UHSU
05391	GW03388IT	9/10/92	VANADIUM	13.00	2.90	UG/L		JA	UHSU
05391	GW03917IT	10/28/92	VANADIUM	14.20	50.00	UG/L	B	V	UHSU

TABLE D-4
UNFILTERED VANADIUM IN UHSU GROUNDWATER

location	fieldid	date_sampled	Analyte	RESULT (µg/l)	REP_LIM	units	qual_lab	qual_wc	location_z
05691	GW02061IT	12/4/91	VANADIUM	164.00	50.00	UG/L		V	UHSU
05691	GW02549IT	3/12/92	VANADIUM	89.80	50.00	UG/L		V	UHSU
05691	GW02885IT	5/28/92	VANADIUM	36.40	50.00	UG/L	B	V	UHSU
05691	GW03389IT	8/21/92	VANADIUM	251.00	2.90	UG/L		V	UHSU
05691	GW03918IT	11/9/92	VANADIUM	771.00	50.00	UG/L		V	UHSU
06091	GW02062IT	12/4/91	VANADIUM	114.00	50.00	UG/L		V	UHSU
06091	GW02576IT	3/12/92	VANADIUM	79.70	50.00	UG/L		V	UHSU
06091	GW03014IT	6/11/92	VANADIUM	48.80	3.50	UG/L		V	UHSU
06091	GW03318IT	8/6/92	VANADIUM	101.00	2.90	UG/L		V	UHSU
06091	GW03903IT	10/19/92	VANADIUM	26.10	3.30	UG/L		V	UHSU
06191	GW03352IT	8/14/92	VANADIUM	22.60	2.90	UG/L		V	UHSU
06491	GW02616IT	4/1/92	VANADIUM	20.10	50.00	UG/L	B	V	UHSU
06491	GW03049IT	6/22/92	VANADIUM	23.00	50.00	UG/L	BE	JA	UHSU
06491	GW03375IT	9/10/92	VANADIUM	9.20	2.90	UG/L		JA	UHSU
06591	GW02895IT	5/19/92	VANADIUM	48.00	50.00	UG/L	B	V	UHSU
06591	GW03427IT	8/27/92	VANADIUM	78.00	2.90	UG/L		V	UHSU
06591	GW03847IT	11/17/92	VANADIUM	36.20	50.00	UG/L	U	V	UHSU
06691	GW02896IT	5/18/92	VANADIUM	9.60	50.00	UG/L	B	V	UHSU
06791	GW02897IT	5/20/92	VANADIUM	23.90	50.00	UG/L	B	V	UHSU
06891	GW02898IT	5/20/92	VANADIUM	4.50	50.00	UG/L	B	JA	UHSU
06891	GW03429IT	8/26/92	VANADIUM	5.80	2.90	UG/L		V	UHSU
06891	GW03851IT	11/18/92	VANADIUM	3.70	50.00	UG/L	B	V	UHSU
06991	GW02899IT	5/18/92	VANADIUM	453.00	50.00	UG/L		V	UHSU
06991	GW03430IT	8/26/92	VANADIUM	127.00	2.90	UG/L		V	UHSU
06991	GW03850IT	11/18/92	VANADIUM	167.00	50.00	UG/L		V	UHSU
07191	GW02900IT	5/18/92	VANADIUM	156.00	50.00	UG/L		V	UHSU
07191	GW03455IT	8/27/92	VANADIUM	207.00	2.90	UG/L		V	UHSU
07391	GW02599IT	3/16/92	VANADIUM	21.20	50.00	UG/L	U	JA	UHSU
07391	GW02902IT	5/21/92	VANADIUM	25.10	50.00	UG/L	U	JA	UHSU
07391	GW03457IT	8/28/92	VANADIUM	2.90	2.90	UG/L	U	V	UHSU
07391	GW03862IT	11/16/92	VANADIUM	5.00	50.00	UG/L	U	V	UHSU
07891	GW02434IT	3/12/92	VANADIUM	16.30	50.00	UG/L	B	V	UHSU
07891	GW02855IT	5/7/92	VANADIUM	30.00	50.00	UG/L	BE	JA	UHSU
07891	GW03353IT	8/20/92	VANADIUM	25.00	2.90	UG/L		V	UHSU
07891	GW03909IT	10/23/92	VANADIUM	10.50	3.30	UG/L		V	UHSU
07991	GW02925IT	5/20/92	VANADIUM	30.00	50.00	UG/L	B	V	UHSU
07991	GW03322IT	8/26/92	VANADIUM	2.90	2.90	UG/L	U	V	UHSU
08891	GW03065IT	6/23/92	VANADIUM	22.80	50.00	UG/L	BE	JA	UHSU
08891	GW03431IT	8/31/92	VANADIUM	11.40	2.90	UG/L		JA	UHSU
08891	GW03849IT	11/17/92	VANADIUM	6.40	50.00	UG/L	U	V	UHSU
09091	GW02903IT	5/20/92	VANADIUM	491.00	50.00	UG/L		JA	UHSU
09091	GW03432IT	8/31/92	VANADIUM	147.00	2.90	UG/L		V	UHSU
09091	GW03852IT	11/18/92	VANADIUM	19.00	50.00	UG/L	B	V	UHSU
09691	GW02608IT	3/18/92	VANADIUM	12.40	50.00	UG/L	B	V	UHSU
09691	GW02904IT	5/22/92	VANADIUM	18.00	50.00	UG/L	B	V	UHSU
09691	GW03458IT	8/31/92	VANADIUM	2.90	2.90	UG/L		JA	UHSU
09691	GW03865IT	11/17/92	VANADIUM	22.50	50.00	UG/L	U	V	UHSU
0987	GW01667IT	8/16/91	VANADIUM	53.90	50.00	UG/L		V	UHSU
0987	GW02088IT	12/16/91	VANADIUM	20.00	50.00	UG/L	B	V	UHSU
0987	GW02402IT	3/6/92	VANADIUM	18.80	50.00	UG/L	B	V	UHSU
0987	GW02942IT	5/26/92	VANADIUM	54.80	50.00	UG/L		V	UHSU
0987	GW03179IT	7/16/92	VANADIUM	21.10	50.00	UG/L	B	V	UHSU
0987	GW03708IT	12/10/92	VANADIUM	16.60	50.00	UG/L	B	V	UHSU
10991	GW02436IT	2/6/92	VANADIUM	345.00	50.00	UG/L	E	JA	UHSU
10991	GW02943IT	5/22/92	VANADIUM	289.00	50.00	UG/L		V	UHSU
10991	GW03289IT	7/28/92	VANADIUM	47.30	50.00	UG/L	B	V	UHSU
10991	GW03728IT	10/23/92	VANADIUM	32.00	3.30	UG/L		V	UHSU

TABLE D-4
UNFILTERED VANADIUM IN UHSU GROUNDWATER

location	fieldid	date_sampled	Analyte	RESULT (µg/l)	REP_LIM	units	qual_lab	qual_wc	location_z
11491	GW02886IT	5/28/92	VANADIUM	16.30	50.00	UG/L	B	V	UHSU
11691	GW03011IT	6/8/92	VANADIUM	26.80	50.00	UG/L	B	V	UHSU
11691	GW03127IT	7/10/92	VANADIUM	43.10	50.00	UG/L	B	V	UHSU
11791	GW02432IT	2/6/92	VANADIUM	44.50	50.00	UG/L	BE	JA	UHSU
11791	GW02917IT	5/20/92	VANADIUM	28.30	50.00	UG/L	B	V	UHSU
11791	GW03465IT	9/8/92	VANADIUM	10.50	2.90	UG/L		JA	UHSU
11791	GW03890IT	11/11/92	VANADIUM	12.60	50.00	UG/L	U	JA	UHSU
11791	GW03891IT	11/12/92	VANADIUM	10.40	50.00	UG/L	U	JA	UHSU
1187	GW01648IT	9/6/91	VANADIUM	10.30	50.00	UG/L	B	V	UHSU
1187	GW02004IT	11/21/91	VANADIUM	8.60	50.00	UG/L	BE	JA	UHSU
1187	GW03460IT	9/1/92	VANADIUM	3.00	50.00	UG/L	U	V	UHSU
11891	GW02117IT	12/19/91	VANADIUM	258.00	50.00	UG/L		V	UHSU
11891	GW02552IT	2/28/92	VANADIUM	96.10	50.00	UG/L	E	JA	UHSU
11891	GW03012IT	6/2/92	VANADIUM	47.50	50.00	UG/L	B	V	UHSU
11891	GW03128IT	7/9/92	VANADIUM	65.20	50.00	UG/L		V	UHSU
11891	GW03901IT	10/16/92	VANADIUM	61.20	3.30	UG/L		V	UHSU
12091	GW02116IT	12/19/91	VANADIUM	19.70	50.00	UG/L	B	V	UHSU
12091	GW02514IT	2/27/92	VANADIUM	12.80	50.00	UG/L	B	V	UHSU
12091	GW02876IT	5/13/92	VANADIUM	34.30	50.00	UG/L	B	V	UHSU
12091	GW03290IT	7/29/92	VANADIUM	23.80	50.00	UG/L	B	V	UHSU
12091	GW03822IT	11/10/92	VANADIUM	17.90	50.00	UG/L	U	JA	UHSU
12191	GW02440IT	3/16/92	VANADIUM	255.00	50.00	UG/L		V	UHSU
12191	GW02862IT	6/3/92	VANADIUM	85.20	50.00	UG/L		V	UHSU
12191	GW03410IT	8/19/92	VANADIUM	120.00	2.90	UG/L		V	UHSU
12191	GW03910IT	10/21/92	VANADIUM	3140.00	16.50	UG/L		V	UHSU
12291	GW02607IT	3/17/92	VANADIUM	27.80	50.00	UG/L	B	V	UHSU
12291	GW02859IT	5/29/92	VANADIUM	7.30	50.00	UG/L	U	JA	UHSU
12391	GW02438IT	2/12/92	VANADIUM	186.00	50.00	UG/L		V	UHSU
12391	GW02887IT	5/14/92	VANADIUM	53.00	50.00	UG/L		V	UHSU
12391	GW03421IT	9/15/92	VANADIUM	42.50	3.30	UG/L		V	UHSU
12391	GW03919IT	12/3/92	VANADIUM	22.80	50.00	UG/L	B	V	UHSU
12491	GW02435IT	2/7/92	VANADIUM	410.00	50.00	UG/L		V	UHSU
12491	GW02888IT	5/14/92	VANADIUM	83.10	50.00	UG/L		V	UHSU
12491	GW03422IT	9/14/92	VANADIUM	113.00	2.90	UG/L		V	UHSU
12491	GW03922IT	10/22/92	VANADIUM	318.00	3.30	UG/L		V	UHSU
12691	GW02437IT	2/13/92	VANADIUM	90.00	50.00	UG/L	E	JA	UHSU
12691	GW02889IT	5/29/92	VANADIUM	16.70	50.00	UG/L	B	V	UHSU
12691	GW03923IT	10/23/92	VANADIUM	6.00	3.30	UG/L		V	UHSU
1287	GW01647IT	9/9/91	VANADIUM	10.00	50.00	UG/L	U	V	UHSU
1287	GW02921IT	5/18/92	VANADIUM	2.90	50.00	UG/L	U	JA	UHSU
12991	GW02601IT	3/17/92	VANADIUM	16.70	50.00	UG/L	B	V	UHSU
12991	GW02911IT	5/22/92	VANADIUM	31.10	50.00	UG/L	B	V	UHSU
12991	GW03437IT	8/28/92	VANADIUM	33.80	5.80	UG/L		V	UHSU
12991	GW03867IT	11/30/92	VANADIUM	32.70	3.00	UG/L		V	UHSU
13091	GW02912IT	5/22/92	VANADIUM	3.50	50.00	UG/L	U	JA	UHSU
13091	GW03440IT	9/9/92	VANADIUM	4.00	2.90	UG/L		JA	UHSU
13191	GW02905IT	5/19/92	VANADIUM	94.70	50.00	UG/L		V	UHSU
13191	GW03433IT	9/2/92	VANADIUM	29.10	2.90	UG/L		V	UHSU
13191	GW03855IT	11/17/92	VANADIUM	23.50	50.00	UG/L	U	V	UHSU
13391	GW03016IT	6/8/92	VANADIUM	69.00	50.00	UG/L		V	UHSU
13391	GW03354IT	8/20/92	VANADIUM	75.30	2.90	UG/L		V	UHSU
13391	GW03906IT	10/20/92	VANADIUM	18.10	3.30	UG/L		V	UHSU
13491	GW03063IT	6/24/92	VANADIUM	265.00	50.00	UG/L	E	JA	UHSU
13491	GW03411IT	8/21/92	VANADIUM	153.00	2.90	UG/L		V	UHSU
13491	GW03928IT	10/22/92	VANADIUM	901.00	3.30	UG/L		V	UHSU
1487	GW01646IT	9/5/91	VANADIUM	13.30	50.00	UG/L	B	V	UHSU
1487	GW02003IT	11/21/91	VANADIUM	12.40	50.00	UG/L	B		UHSU

TABLE D-4
UNFILTERED VANADIUM IN UHSU GROUNDWATER

location	fieldid	date_sampled	Analyte	RESULT (µg/l)	REP_LIM	units	qual_lab	qual_wc	location_z
1487	GW02388IT	2/21/92	VANADIUM	16.90	50.00	UG/L	B	V	UHSU
1487	GW02922IT	5/20/92	VANADIUM	12.20	50.00	UG/L	B	V	UHSU
1487	GW03461IT	8/31/92	VANADIUM	9.60	50.00	UG/L	U	JA	UHSU
1587	GW01650IT	9/4/91	VANADIUM	83.50	50.00	UG/L		V	UHSU
1587	GW02005IT	12/18/91	VANADIUM	30.00	50.00	UG/L	BE	JA	UHSU
1587	GW02422IT	2/25/92	VANADIUM	73.60	50.00	UG/L		V	UHSU
1587	GW02914IT	6/23/92	VANADIUM	93.40	50.00	UG/L	E	JA	UHSU
1587	GW03442IT	9/1/92	VANADIUM	51.60	50.00	UG/L		V	UHSU
1787	GW01687IT	8/19/91	VANADIUM	11.90	50.00	UG/L	B	V	UHSU
1787	GW02031IT	11/18/91	VANADIUM	43.40	50.00	UG/L	BE	JA	UHSU
1787	GW02424IT	2/24/92	VANADIUM	10.00	50.00	UG/L	B	V	UHSU
1787	GW02844IT	4/30/92	VANADIUM	14.10	50.00	UG/L	BE	JA	UHSU
1787	GW03281IT	7/29/92	VANADIUM	12.20	50.00	UG/L	B	V	UHSU
1787	GW03823IT	11/10/92	VANADIUM	8.00	50.00	UG/L	U	JA	UHSU
2387	GW01669IT	8/19/91	VANADIUM	12.40	50.00	UG/L	B	V	UHSU
2387	GW02032IT	11/23/91	VANADIUM	37.30	50.00	UG/L	BE	JA	UHSU
2387	GW02405IT	2/28/92	VANADIUM	18.40	50.00	UG/L	BE	JA	UHSU
2387	GW02845IT	5/28/92	VANADIUM	13.70	50.00	UG/L	B	V	UHSU
2387	GW03256IT	7/30/92	VANADIUM	13.60	50.00	UG/L	B	V	UHSU
2387	GW03816IT	11/6/92	VANADIUM	31.20	50.00	UG/L	U	JA	UHSU
2587	GW01685IT	9/10/91	VANADIUM	29.80	50.00	UG/L	B	V	UHSU
2587	GW02039IT	11/18/91	VANADIUM	36.90	50.00	UG/L	BE	JA	UHSU
2587	GW02406IT	3/3/92	VANADIUM	18.70	50.00	UG/L	BE	JA	UHSU
2587	GW02865IT	5/15/92	VANADIUM	12.40	50.00	UG/L	B	V	UHSU
2587	GW03348IT	9/22/92	VANADIUM	12.30	50.00	UG/L	U	JA	UHSU
2587	GW03912IT	10/27/92	VANADIUM	5.00	50.00	UG/L	U	V	UHSU
2987	GW01703IT	8/21/91	VANADIUM	31.20	50.00	UG/L	B	V	UHSU
2987	GW02080IT	12/7/91	VANADIUM	19.90	50.00	UG/L	B	V	UHSU
2987	GW02412IT	2/12/92	VANADIUM	19.70	50.00	UG/L	B	V	UHSU
2987	GW03058IT	6/9/92	VANADIUM	33.90	50.00	UG/L	B	V	UHSU
2987	GW03292IT	7/31/92	VANADIUM	35.10	50.00	UG/L	U	JA	UHSU
2987	GW03730IT	10/27/92	VANADIUM	32.00	50.00	UG/L	U	V	UHSU
3287	GW01642IT	9/4/91	VANADIUM	80.80	50.00	UG/L		V	UHSU
3287	GW02012IT	11/22/91	VANADIUM	30.50	50.00	UG/L	BE	JA	UHSU
3287	GW02429IT	2/25/92	VANADIUM	63.70	50.00	UG/L		V	UHSU
3287	GW02936IT	5/18/92	VANADIUM	60.60	50.00	UG/L		V	UHSU
3287	GW03447IT	9/9/92	VANADIUM	49.90	50.00	UG/L	U	V	UHSU
3287	GW03880IT	11/30/92	VANADIUM	41.40	3.00	UG/L		V	UHSU
34791	GW02157IT	12/17/91	VANADIUM	14.50	50.00	UG/L	BE	JA	UHSU
34791	GW02447IT	2/10/92	VANADIUM	9.70	50.00	UG/L	B	V	UHSU
34791	GW02908IT	5/20/92	VANADIUM	8.00	50.00	UG/L	B	V	UHSU
34791	GW03459IT	9/2/92	VANADIUM	2.90	2.90	UG/L	U	JA	UHSU
34791	GW03863IT	11/16/92	VANADIUM	6.70	50.00	UG/L	U	V	UHSU
3586	GW01818IT	10/8/91	VANADIUM	5.30	50.00	UG/L	B	V	UHSU
3586	GW02195IT	1/10/92	VANADIUM	10.80	50.00	UG/L	B	V	UHSU
3586	GW02631IT	4/7/92	VANADIUM	9.50	50.00	UG/L	U	JA	UHSU
3586	GW03217IT	8/5/92	VANADIUM	3.00	50.00	UG/L	U	V	UHSU
3586	GW03828IT	12/10/92	VANADIUM	7.10	50.00	UG/L	B	V	UHSU
3687	GW01674IT	8/23/91	VANADIUM	13.80	50.00	UG/L	B	V	UHSU
3687	GW02036IT	11/25/91	VANADIUM	10.00	50.00	UG/L	B	V	UHSU
3687	GW02414IT	3/5/92	VANADIUM	10.60	50.00	UG/L	B	V	UHSU
3687	GW02852IT	5/15/92	VANADIUM	7.00	50.00	UG/L	U	JA	UHSU
3687	GW03384IT	8/17/92	VANADIUM	23.70	50.00	UG/L	U	JA	UHSU
3687	GW03924IT	10/27/92	VANADIUM	23.30	50.00	UG/L	U	JA	UHSU
3986	GW01592IT	8/16/91	VANADIUM	15.10	50.00	UG/L	B	V	UHSU
3986	GW02049IT	12/5/91	VANADIUM	8.50	50.00	UG/L	B	V	UHSU
3986	GW02241IT	1/21/92	VANADIUM	19.60	50.00	UG/L	B	V	UHSU

TABLE D-4
UNFILTERED VANADIUM IN UHSU GROUNDWATER

location	fieldid	date_sampled	Analyte	RESULT (µg/l)	REP_LIM	units	qual_lab	qual_wc	location_z
3986	GW02668IT	4/16/92	VANADIUM	15.20	50.00	UG/L	B	V	UHSU
3986	GW03328IT	9/8/92	VANADIUM	14.70	50.00	UG/L	U	JA	UHSU
3986	GW03893IT	10/19/92	VANADIUM	32.40	50.00	UG/L	U	V	UHSU
41591	GW02091IT	12/6/91	VANADIUM	86.40	50.00	UG/L		V	UHSU
41591	GW02614IT	3/18/92	VANADIUM	54.50	50.00	UG/L		V	UHSU
41591	GW02952IT	6/10/92	VANADIUM	129.00	3.50	UG/L		V	UHSU
41591	GW03395IT	9/15/92	VANADIUM	58.40	3.30	UG/L		V	UHSU
41591	GW03811IT	11/17/92	VANADIUM	23.60	50.00	UG/L	U	V	UHSU
41691	GW02090IT	12/7/91	VANADIUM	312.00	50.00	UG/L		V	UHSU
41691	GW02615IT	4/1/92	VANADIUM	89.20	50.00	UG/L		V	UHSU
41691	GW02953IT	6/11/92	VANADIUM	152.00	3.50	UG/L		V	UHSU
41691	GW03396IT	9/16/92	VANADIUM	68.00	3.30	UG/L		V	UHSU
41691	GW03806IT	11/18/92	VANADIUM	43.40	50.00	UG/L	B	V	UHSU
4286	GW01706IT	9/11/91	VANADIUM	77.80	50.00	UG/L		V	UHSU
4286	GW02044IT	12/4/91	VANADIUM	20.70	50.00	UG/L	B	V	UHSU
4286	GW02398IT	2/10/92	VANADIUM	118.00	50.00	UG/L		V	UHSU
4286	GW02846IT	5/29/92	VANADIUM	38.40	50.00	UG/L	B	V	UHSU
4286	GW03385IT	8/17/92	VANADIUM	63.20	50.00	UG/L		V	UHSU
4286	GW03925IT	11/30/92	VANADIUM	19.40	3.00	UG/L		V	UHSU
6286	GW01708IT	8/22/91	VANADIUM	8.60	50.00	UG/L	B	V	UHSU
6286	GW02046IT	11/25/91	VANADIUM	8.50	50.00	UG/L	BE	JA	UHSU
6286	GW02378IT	2/11/92	VANADIUM	8.90	50.00	UG/L	B	V	UHSU
6286	GW03056IT	6/11/92	VANADIUM	8.10	3.50	UG/L		JA	UHSU
6286	GW03294IT	7/31/92	VANADIUM	10.40	50.00	UG/L	U	JA	UHSU
6286	GW03885IT	11/9/92	VANADIUM	5.00	50.00	UG/L	U	V	UHSU
6586	GW01671IT	8/16/91	VANADIUM	8.90	50.00	UG/L	B	V	UHSU
6586	GW02050IT	12/6/91	VANADIUM	5.40	50.00	UG/L	B	V	UHSU
6586	GW02326IT	1/23/92	VANADIUM	6.60	50.00	UG/L	B		UHSU
6586	GW02840IT	4/30/92	VANADIUM	5.60	50.00	UG/L	U	JA	UHSU
6586	GW03308IT	8/6/92	VANADIUM	3.00	50.00	UG/L	U	V	UHSU
6586	GW03947IT	12/14/92	VANADIUM	7.00	3.00	UG/L	U	V	UHSU
B218789	GW01673IT	20-Aug-91	VANADIUM	10.70	50.00	UG/L	B	V	UHSU
B218789	GW02034IT	19-Nov-91	VANADIUM	40.80	50.00	UG/L	B		UHSU
B218789	GW02419IT	18-Feb-92	VANADIUM	27.90	50.00	UG/L	B	V	UHSU
B218789	GW02866IT	8-May-92	VANADIUM	9.30	50.00	UG/L	B	V	UHSU
B218789	GW03349IT	21-Aug-92	VANADIUM	13.90	2.90	UG/L		V	UHSU

TABLE D-5
TOTAL SUSPENDED SOLIDS IN UHSU GROUNDWATER

location	fieldid	date_sampled	chemical	result (mg/l)	detectionlimit	qual_lab	qual_wc	location_z
00191	GW02596IT	03/16/92	TOTAL SUSPENDED SOLIDS	75	4		V	UHSU
00191	GW02909IT	05/21/92	TOTAL SUSPENDED SOLIDS	140	4		V	UHSU
00191	GW03435IT	09/01/92	TOTAL SUSPENDED SOLIDS	286	5		V	UHSU
00191	GW03861IT	11/18/92	TOTAL SUSPENDED SOLIDS	1900	4		V	UHSU
00291	GW02581IT	03/11/92	TOTAL SUSPENDED SOLIDS	1000	4		V	UHSU
00291	GW02910IT	05/21/92	TOTAL SUSPENDED SOLIDS	1600	4		V	UHSU
00291	GW03436IT	09/08/92	TOTAL SUSPENDED SOLIDS	8200	5		V	UHSU
00291	GW03868IT	11/30/92	TOTAL SUSPENDED SOLIDS	7700	5		V	UHSU
00391	GW02158IT	12/17/91	TOTAL SUSPENDED SOLIDS	630	4		V	UHSU
00391	GW02526IT	02/28/92	TOTAL SUSPENDED SOLIDS	130	4		V	UHSU
00391	GW02915IT	05/21/92	TOTAL SUSPENDED SOLIDS	95	4		V	UHSU
00391	GW03453IT	09/08/92	TOTAL SUSPENDED SOLIDS	377	5		V	UHSU
00391	GW03888IT	11/11/92	TOTAL SUSPENDED SOLIDS	260	4		V	UHSU
00491	GW02159IT	12/18/91	TOTAL SUSPENDED SOLIDS	520	4		V	UHSU
00491	GW02527IT	02/28/92	TOTAL SUSPENDED SOLIDS	160	4		V	UHSU
00491	GW02916IT	05/20/92	TOTAL SUSPENDED SOLIDS	340	4		V	UHSU
00491	GW03462IT	09/01/92	TOTAL SUSPENDED SOLIDS	111	5		V	UHSU
00491	GW03889IT	11/09/92	TOTAL SUSPENDED SOLIDS	130	4		V	UHSU
00691	GW02918IT	05/19/92	TOTAL SUSPENDED SOLIDS	340	4		V	UHSU
01291	GW02930IT	05/21/92	TOTAL SUSPENDED SOLIDS	7	4		V	UHSU
01391	GW02857IT	05/26/92	TOTAL SUSPENDED SOLIDS	150	4		V	UHSU
01391	GW03259IT	07/30/92	TOTAL SUSPENDED SOLIDS	310	4		V	UHSU
01491	GW02597IT	03/18/92	TOTAL SUSPENDED SOLIDS	11000	4		V	UHSU
01491	GW02858IT	05/15/92	TOTAL SUSPENDED SOLIDS	7000	4		V	UHSU
01491	GW03260IT	07/30/92	TOTAL SUSPENDED SOLIDS	24000	4		V	UHSU
01491	GW03814IT	11/19/92	TOTAL SUSPENDED SOLIDS	2200	4		V	UHSU
01791	GW02173IT	12/19/91	TOTAL SUSPENDED SOLIDS	6800	4		V	UHSU
01791	GW02598IT	03/17/92	TOTAL SUSPENDED SOLIDS	3400	4		V	UHSU
01791	GW02871IT	05/14/92	TOTAL SUSPENDED SOLIDS	370	4		V	UHSU
01791	GW03283IT	08/03/92	TOTAL SUSPENDED SOLIDS	4000	5		V	UHSU
01791	GW03817IT	11/05/92	TOTAL SUSPENDED SOLIDS	2500	4		V	UHSU
01891	GW02178IT	12/23/91	TOTAL SUSPENDED SOLIDS	490	4		V	UHSU
01891	GW02509IT	02/27/92	TOTAL SUSPENDED SOLIDS	610	4		V	UHSU
01891	GW02872IT	05/13/92	TOTAL SUSPENDED SOLIDS	590	4		V	UHSU
01891	GW03284IT	07/29/92	TOTAL SUSPENDED SOLIDS	960	4		V	UHSU
01991	GW02853IT	06/04/92	TOTAL SUSPENDED SOLIDS	3300	4		V	UHSU
01991	GW03350IT	09/14/92	TOTAL SUSPENDED SOLIDS	565	5		V	UHSU
01991	GW03907IT	10/23/92	TOTAL SUSPENDED SOLIDS	709	5		V	UHSU
02091	GW02138IT	12/14/91	TOTAL SUSPENDED SOLIDS	1400	4		V	UHSU
02091	GW02510IT	02/26/92	TOTAL SUSPENDED SOLIDS	740	4		V	UHSU
02091	GW02873IT	05/15/92	TOTAL SUSPENDED SOLIDS	530	4		V	UHSU
02091	GW03285IT	07/31/92	TOTAL SUSPENDED SOLIDS	740	5		V	UHSU
02091	GW03819IT	11/06/92	TOTAL SUSPENDED SOLIDS	1500	4		V	UHSU
02291	GW02113IT	12/16/91	TOTAL SUSPENDED SOLIDS	1400	4		V	UHSU
02291	GW02511IT	02/26/92	TOTAL SUSPENDED SOLIDS	960	4		V	UHSU
02291	GW02874IT	05/14/92	TOTAL SUSPENDED SOLIDS	410	4		V	UHSU
02291	GW03286IT	07/31/92	TOTAL SUSPENDED SOLIDS	890	5		V	UHSU
02291	GW03820IT	10/29/92	TOTAL SUSPENDED SOLIDS	1780	5		V	UHSU
02491	GW02114IT	12/16/91	TOTAL SUSPENDED SOLIDS	400	4		V	UHSU
02491	GW02572IT	03/11/92	TOTAL SUSPENDED SOLIDS	57	4		V	UHSU
02491	GW02875IT	05/15/92	TOTAL SUSPENDED SOLIDS	270	4		V	UHSU
02491	GW03287IT	07/31/92	TOTAL SUSPENDED SOLIDS	250	5		V	UHSU
02491	GW03821IT	11/09/92	TOTAL SUSPENDED SOLIDS	120	4		V	UHSU
02591	GW03015IT	06/09/92	TOTAL SUSPENDED SOLIDS	880	4		V	UHSU
02591	GW03314IT	08/11/92	TOTAL SUSPENDED SOLIDS	559	5		V	UHSU
02591	GW03904IT	10/20/92	TOTAL SUSPENDED SOLIDS	276	5		V	UHSU
0286	GW01454IT	06/19/91	TOTAL SUSPENDED SOLIDS	140	4		JA	UHSU

TABLE D-5
TOTAL SUSPENDED SOLIDS IN UHSU GROUNDWATER

location	fieldid	date_sampled	chemical	result (mg/l)	detectionlimit	qual_lab	qual_wc	location_z
0286	GW02611IT	03/18/92	TOTAL SUSPENDED SOLIDS	32	4		V	UHSU
0286	GW02955IT	06/10/92	TOTAL SUSPENDED SOLIDS	160	5			UHSU
02991	GW02441IT	03/12/92	TOTAL SUSPENDED SOLIDS	750	4		V	UHSU
02991	GW02854IT	05/08/92	TOTAL SUSPENDED SOLIDS	1700	4		V	UHSU
02991	GW03351IT	08/21/92	TOTAL SUSPENDED SOLIDS	597	5		V	UHSU
02991	GW03908IT	10/20/92	TOTAL SUSPENDED SOLIDS	360	5		V	UHSU
03091	GW02134IT	12/14/91	TOTAL SUSPENDED SOLIDS	1600	4		V	UHSU
03091	GW02568IT	03/05/92	TOTAL SUSPENDED SOLIDS	810	4		V	UHSU
03091	GW02881IT	05/12/92	TOTAL SUSPENDED SOLIDS	470	4		V	UHSU
03091	GW03409IT	08/19/92	TOTAL SUSPENDED SOLIDS	642	5		V	UHSU
03091	GW03914IT	10/22/92	TOTAL SUSPENDED SOLIDS	1590	5		V	UHSU
03191	GW02156IT	12/19/91	TOTAL SUSPENDED SOLIDS	130	4		V	UHSU
03191	GW02165IT	12/18/91	TOTAL SUSPENDED SOLIDS	440	4		JA	UHSU
03191	GW02882IT	05/12/92	TOTAL SUSPENDED SOLIDS	620	4		V	UHSU
03391	GW02092IT	12/05/91	TOTAL SUSPENDED SOLIDS	7400	4		V	UHSU
03391	GW02547IT	03/13/92	TOTAL SUSPENDED SOLIDS	200	4		V	UHSU
03391	GW03006IT	06/02/92	TOTAL SUSPENDED SOLIDS	4000	4		V	UHSU
03391	GW03123IT	07/09/92	TOTAL SUSPENDED SOLIDS	3400	4		V	UHSU
03391	GW03896IT	10/16/92	TOTAL SUSPENDED SOLIDS	2060	5		V	UHSU
03591	GW02161IT	12/19/91	TOTAL SUSPENDED SOLIDS	560	4		V	UHSU
03591	GW02567IT	03/05/92	TOTAL SUSPENDED SOLIDS	19	4		V	UHSU
03591	GW02883IT	06/04/92	TOTAL SUSPENDED SOLIDS	800	4		V	UHSU
03591	GW03387IT	08/13/92	TOTAL SUSPENDED SOLIDS	1890	5		V	UHSU
03591	GW03916IT	10/23/92	TOTAL SUSPENDED SOLIDS	600	5		V	UHSU
03691	GW03048IT	06/08/92	TOTAL SUSPENDED SOLIDS	5900	4		V	UHSU
03691	GW03124IT	07/08/92	TOTAL SUSPENDED SOLIDS	2100	4		V	UHSU
03691	GW03897IT	10/21/92	TOTAL SUSPENDED SOLIDS	2130	5		V	UHSU
03791	GW02093IT	12/06/91	TOTAL SUSPENDED SOLIDS	4500	4		V	UHSU
03791	GW02557IT	03/19/92	TOTAL SUSPENDED SOLIDS	7400	4		V	UHSU
03791	GW03007IT	06/10/92	TOTAL SUSPENDED SOLIDS	1000	5			UHSU
03791	GW03125IT	07/10/92	TOTAL SUSPENDED SOLIDS	680	4		V	UHSU
03791	GW03898IT	10/16/92	TOTAL SUSPENDED SOLIDS	325	5		V	UHSU
0386	GW01455IT	06/20/91	TOTAL SUSPENDED SOLIDS	20	4		V	UHSU
0386	GW01762IT	09/11/91	TOTAL SUSPENDED SOLIDS	48	4			UHSU
0386	GW02026IT	11/13/91	TOTAL SUSPENDED SOLIDS	31	4		V	UHSU
0386	GW02612IT	04/01/92	TOTAL SUSPENDED SOLIDS	7	4		V	UHSU
0386	GW02956IT	06/12/92	TOTAL SUSPENDED SOLIDS	22	5			UHSU
0386	GW03392IT	09/16/92	TOTAL SUSPENDED SOLIDS	10	5		V	UHSU
0386	GW03810IT	11/17/92	TOTAL SUSPENDED SOLIDS	19	5		V	UHSU
03991	GW03010IT	06/23/92	TOTAL SUSPENDED SOLIDS	5800	4		V	UHSU
03991	GW03126IT	07/08/92	TOTAL SUSPENDED SOLIDS	9200	4		V	UHSU
03991	GW03899IT	10/21/92	TOTAL SUSPENDED SOLIDS	13100	5		V	UHSU
04091	GW03013IT	06/24/92	TOTAL SUSPENDED SOLIDS	27	4		V	UHSU
04091	GW03317IT	08/12/92	TOTAL SUSPENDED SOLIDS	23	5		V	UHSU
04091	GW03902IT	10/22/92	TOTAL SUSPENDED SOLIDS	43	5		V	UHSU
04191	GW02923IT	05/19/92	TOTAL SUSPENDED SOLIDS	970	4		V	UHSU
04191	GW03319IT	08/27/92	TOTAL SUSPENDED SOLIDS	92	5		V	UHSU
04291	GW02924IT	05/19/92	TOTAL SUSPENDED SOLIDS	330	4		V	UHSU
04491	GW03321IT	09/02/92	TOTAL SUSPENDED SOLIDS	54.4	5		V	UHSU
04591	GW02175IT	12/20/91	TOTAL SUSPENDED SOLIDS	2600	4		V	UHSU
04591	GW02525IT	03/03/92	TOTAL SUSPENDED SOLIDS	610	4		V	UHSU
04591	GW02931IT	05/22/92	TOTAL SUSPENDED SOLIDS	940	4		V	UHSU
04591	GW03450IT	08/31/92	TOTAL SUSPENDED SOLIDS	464	5		V	UHSU
04591	GW03882IT	12/08/92	TOTAL SUSPENDED SOLIDS	750	5		V	UHSU
04691	GW03451IT	09/02/92	TOTAL SUSPENDED SOLIDS	142	5		V	UHSU
04891	GW03235IT	08/19/92	TOTAL SUSPENDED SOLIDS	63.6	5		V	UHSU
04991	GW02939IT	05/21/92	TOTAL SUSPENDED SOLIDS	420	4		V	UHSU

TABLE D-5
TOTAL SUSPENDED SOLIDS IN UHSU GROUNDWATER

location	fieldid	date_sampled	chemical	result (mg/l)	detectionlimit	qual_lab	qual_wc	location_z
04991	GW03236IT	07/27/92	TOTAL SUSPENDED SOLIDS	1100	4		V	UHSU
04991	GW03725IT	10/28/92	TOTAL SUSPENDED SOLIDS	320	4		V	UHSU
05091	GW02177IT	12/23/91	TOTAL SUSPENDED SOLIDS	370	4		V	UHSU
05091	GW02570IT	03/06/92	TOTAL SUSPENDED SOLIDS	110	4		JA	UHSU
05091	GW02619IT	03/26/92	TOTAL SUSPENDED SOLIDS	300	4		V	UHSU
05091	GW02940IT	05/20/92	TOTAL SUSPENDED SOLIDS	220	4		V	UHSU
05091	GW03237IT	07/28/92	TOTAL SUSPENDED SOLIDS	500	4		V	UHSU
05091	GW03726IT	10/28/92	TOTAL SUSPENDED SOLIDS	1000	4		V	UHSU
05191	GW02160IT	12/17/91	TOTAL SUSPENDED SOLIDS	9100	4		V	UHSU
05191	GW02571IT	03/05/92	TOTAL SUSPENDED SOLIDS	3500	4		V	UHSU
05191	GW02941IT	05/21/92	TOTAL SUSPENDED SOLIDS	980	4		V	UHSU
05191	GW03238IT	07/24/92	TOTAL SUSPENDED SOLIDS	1700	4		V	UHSU
05191	GW03727IT	10/28/92	TOTAL SUSPENDED SOLIDS	3000	4		V	UHSU
05391	GW02084IT	12/05/91	TOTAL SUSPENDED SOLIDS	630	4		V	UHSU
05391	GW02566IT	03/05/92	TOTAL SUSPENDED SOLIDS	850	4		V	UHSU
05391	GW02884IT	06/11/92	TOTAL SUSPENDED SOLIDS	490	5			UHSU
05391	GW03388IT	09/10/92	TOTAL SUSPENDED SOLIDS	806	5		V	UHSU
05391	GW03917IT	10/28/92	TOTAL SUSPENDED SOLIDS	210	4		V	UHSU
05691	GW02061IT	12/04/91	TOTAL SUSPENDED SOLIDS	9100	4		V	UHSU
05691	GW02549IT	03/12/92	TOTAL SUSPENDED SOLIDS	2600	4		V	UHSU
05691	GW02885IT	05/28/92	TOTAL SUSPENDED SOLIDS	1900	4		V	UHSU
05691	GW03389IT	08/21/92	TOTAL SUSPENDED SOLIDS	2720	5		V	UHSU
05691	GW03918IT	11/09/92	TOTAL SUSPENDED SOLIDS	11000	4		V	UHSU
06091	GW02062IT	12/04/91	TOTAL SUSPENDED SOLIDS	3300	4		V	UHSU
06091	GW02576IT	03/12/92	TOTAL SUSPENDED SOLIDS	4200	4		V	UHSU
06091	GW03014IT	06/11/92	TOTAL SUSPENDED SOLIDS	1300	5			UHSU
06091	GW03318IT	08/06/92	TOTAL SUSPENDED SOLIDS	2220	5		V	UHSU
06091	GW03903IT	10/19/92	TOTAL SUSPENDED SOLIDS	5190	5		V	UHSU
06191	GW03352IT	08/14/92	TOTAL SUSPENDED SOLIDS	979	5		V	UHSU
06191	GW03905IT	10/20/92	TOTAL SUSPENDED SOLIDS	308	5		V	UHSU
06291	GW03329IT	09/03/92	TOTAL SUSPENDED SOLIDS	764	5		V	UHSU
06491	GW02616IT	04/01/92	TOTAL SUSPENDED SOLIDS	470	4		V	UHSU
06491	GW03049IT	06/22/92	TOTAL SUSPENDED SOLIDS	1000	4		V	UHSU
06491	GW03375IT	09/10/92	TOTAL SUSPENDED SOLIDS	461	5		V	UHSU
06491	GW03808IT	11/13/92	TOTAL SUSPENDED SOLIDS	190	4		V	UHSU
06591	GW02895IT	05/19/92	TOTAL SUSPENDED SOLIDS	8700	4		V	UHSU
06591	GW03427IT	08/27/92	TOTAL SUSPENDED SOLIDS	2810	5		V	UHSU
06591	GW03847IT	11/17/92	TOTAL SUSPENDED SOLIDS	520	5		V	UHSU
06691	GW02896IT	05/18/92	TOTAL SUSPENDED SOLIDS	260	4		V	UHSU
06691	GW03428IT	08/28/92	TOTAL SUSPENDED SOLIDS	19.5	5		V	UHSU
06691	GW03848IT	11/17/92	TOTAL SUSPENDED SOLIDS	12	5		V	UHSU
06791	GW02897IT	05/20/92	TOTAL SUSPENDED SOLIDS	880	4		V	UHSU
06891	GW02898IT	05/20/92	TOTAL SUSPENDED SOLIDS	310	4		V	UHSU
06891	GW03429IT	08/26/92	TOTAL SUSPENDED SOLIDS	298	5		V	UHSU
06891	GW03851IT	11/18/92	TOTAL SUSPENDED SOLIDS	380	4		V	UHSU
06991	GW02899IT	05/18/92	TOTAL SUSPENDED SOLIDS	32000	4		V	UHSU
06991	GW03430IT	08/26/92	TOTAL SUSPENDED SOLIDS	2370	5		V	UHSU
06991	GW03850IT	11/18/92	TOTAL SUSPENDED SOLIDS	2800	4		V	UHSU
07191	GW02900IT	05/18/92	TOTAL SUSPENDED SOLIDS	15000	4		V	UHSU
07191	GW03455IT	08/27/92	TOTAL SUSPENDED SOLIDS	3180	5		V	UHSU
07191	GW03864IT	11/16/92	TOTAL SUSPENDED SOLIDS	3100	5		V	UHSU
07291	GW02901IT	05/20/92	TOTAL SUSPENDED SOLIDS	21	4		V	UHSU
07291	GW03857IT	11/16/92	TOTAL SUSPENDED SOLIDS	5	5	U	V	UHSU
07391	GW02599IT	03/16/92	TOTAL SUSPENDED SOLIDS	83	4		V	UHSU
07391	GW02902IT	05/21/92	TOTAL SUSPENDED SOLIDS	92	4		V	UHSU
07391	GW03457IT	08/28/92	TOTAL SUSPENDED SOLIDS	45	5		V	UHSU
07391	GW03862IT	11/16/92	TOTAL SUSPENDED SOLIDS	23	5		V	UHSU

TABLE D-5
TOTAL SUSPENDED SOLIDS IN UHSU GROUNDWATER

location	fieldid	date_sampled	chemical	result (mg/l)	detectionlimit	qual_lab	qual_wc	location_z
07891	GW02434IT	03/12/92	TOTAL SUSPENDED SOLIDS	200	4		V	UHSU
07891	GW02855IT	05/07/92	TOTAL SUSPENDED SOLIDS	1000	4		V	UHSU
07891	GW03353IT	08/20/92	TOTAL SUSPENDED SOLIDS	1090	5		V	UHSU
07891	GW03909IT	10/23/92	TOTAL SUSPENDED SOLIDS	258	5		V	UHSU
07991	GW02925IT	05/20/92	TOTAL SUSPENDED SOLIDS	1300	4		V	UHSU
07991	GW03322IT	08/26/92	TOTAL SUSPENDED SOLIDS	563	5		V	UHSU
07991	GW03874IT	12/04/92	TOTAL SUSPENDED SOLIDS	74	4		V	UHSU
08091	GW02926IT	05/19/92	TOTAL SUSPENDED SOLIDS	810	4		V	UHSU
08891	GW03065IT	06/23/92	TOTAL SUSPENDED SOLIDS	180	4		V	UHSU
08891	GW03431IT	08/31/92	TOTAL SUSPENDED SOLIDS	529	5		V	UHSU
08891	GW03849IT	11/17/92	TOTAL SUSPENDED SOLIDS	130	5		V	UHSU
09091	GW02903IT	05/20/92	TOTAL SUSPENDED SOLIDS	9700	4		V	UHSU
09091	GW03432IT	08/31/92	TOTAL SUSPENDED SOLIDS	5820	5		V	UHSU
09091	GW03852IT	11/18/92	TOTAL SUSPENDED SOLIDS	1800	4		V	UHSU
09691	GW02608IT	03/18/92	TOTAL SUSPENDED SOLIDS	250	4		V	UHSU
09691	GW02904IT	05/22/92	TOTAL SUSPENDED SOLIDS	460	4		V	UHSU
09691	GW03458IT	08/31/92	TOTAL SUSPENDED SOLIDS	198	5		V	UHSU
09691	GW03865IT	11/17/92	TOTAL SUSPENDED SOLIDS	450	5		V	UHSU
0987	GW01297IT	05/15/91	TOTAL SUSPENDED SOLIDS	590	4		V	UHSU
0987	GW01667IT	08/16/91	TOTAL SUSPENDED SOLIDS	660	4		V	UHSU
0987	GW02088IT	12/16/91	TOTAL SUSPENDED SOLIDS	280	4		V	UHSU
0987	GW02402IT	03/06/92	TOTAL SUSPENDED SOLIDS	130	4		V	UHSU
0987	GW02942IT	05/26/92	TOTAL SUSPENDED SOLIDS	930	4		V	UHSU
0987	GW03179IT	07/16/92	TOTAL SUSPENDED SOLIDS	560	4		V	UHSU
0987	GW03708IT	12/10/92	TOTAL SUSPENDED SOLIDS	240	4		V	UHSU
1087	GW02919IT	05/26/92	TOTAL SUSPENDED SOLIDS	160	4		V	UHSU
10991	GW02436IT	02/06/92	TOTAL SUSPENDED SOLIDS	9800	4		V	UHSU
10991	GW02943IT	05/22/92	TOTAL SUSPENDED SOLIDS	8800	4		V	UHSU
10991	GW03289IT	07/28/92	TOTAL SUSPENDED SOLIDS	920	4		V	UHSU
10991	GW03728IT	10/23/92	TOTAL SUSPENDED SOLIDS	742	5		V	UHSU
11491	GW02886IT	05/28/92	TOTAL SUSPENDED SOLIDS	600	4		V	UHSU
11691	GW02174IT	12/23/91	TOTAL SUSPENDED SOLIDS	1100	4		V	UHSU
11691	GW02551IT	03/18/92	TOTAL SUSPENDED SOLIDS	510	4		V	UHSU
11691	GW03011IT	06/08/92	TOTAL SUSPENDED SOLIDS	570	4		V	UHSU
11691	GW03127IT	07/10/92	TOTAL SUSPENDED SOLIDS	410	4		V	UHSU
11691	GW03900IT	10/20/92	TOTAL SUSPENDED SOLIDS	188	5		V	UHSU
11791	GW02432IT	02/06/92	TOTAL SUSPENDED SOLIDS	1700	4		V	UHSU
11791	GW02917IT	05/20/92	TOTAL SUSPENDED SOLIDS	1200	4		V	UHSU
11791	GW03465IT	09/08/92	TOTAL SUSPENDED SOLIDS	504	5		V	UHSU
11791	GW03890IT	11/11/92	TOTAL SUSPENDED SOLIDS	140	4		V	UHSU
11791	GW03891IT	11/12/92	TOTAL SUSPENDED SOLIDS	5	5	U	V	UHSU
1187	GW01090IT	04/17/91	TOTAL SUSPENDED SOLIDS	9	4		V	UHSU
1187	GW01648IT	09/06/91	TOTAL SUSPENDED SOLIDS	5	4		V	UHSU
1187	GW02004IT	11/21/91	TOTAL SUSPENDED SOLIDS	6	4		V	UHSU
1187	GW02386IT	02/22/92	TOTAL SUSPENDED SOLIDS	7	4		V	UHSU
1187	GW02920IT	05/19/92	TOTAL SUSPENDED SOLIDS	10	4		V	UHSU
1187	GW03460IT	09/01/92	TOTAL SUSPENDED SOLIDS	5	5	U	V	UHSU
1187	GW03887IT	11/19/92	TOTAL SUSPENDED SOLIDS	5	4		V	UHSU
11891	GW02117IT	12/19/91	TOTAL SUSPENDED SOLIDS	460	4		V	UHSU
11891	GW02552IT	02/28/92	TOTAL SUSPENDED SOLIDS	2000	4		V	UHSU
11891	GW03012IT	06/02/92	TOTAL SUSPENDED SOLIDS	760	4		V	UHSU
11891	GW03128IT	07/09/92	TOTAL SUSPENDED SOLIDS	950	4		V	UHSU
11891	GW03901IT	10/16/92	TOTAL SUSPENDED SOLIDS	3740	5		V	UHSU
12091	GW02116IT	12/19/91	TOTAL SUSPENDED SOLIDS	300	4		V	UHSU
12091	GW02514IT	02/27/92	TOTAL SUSPENDED SOLIDS	220	4		V	UHSU
12091	GW02876IT	05/13/92	TOTAL SUSPENDED SOLIDS	1000	4		V	UHSU
12091	GW03290IT	07/29/92	TOTAL SUSPENDED SOLIDS	660	4		V	UHSU

TABLE D-5
TOTAL SUSPENDED SOLIDS IN UHSU GROUNDWATER

location	fieldid	date_sampled	chemical	result (mg/l)	detectionlimit	qual_lab	qual_wc	location_z
12091	GW03822IT	11/10/92	TOTAL SUSPENDED SOLIDS	430	4		V	UHSU
12191	GW02440IT	03/16/92	TOTAL SUSPENDED SOLIDS	1100	4		V	UHSU
12191	GW02862IT	06/03/92	TOTAL SUSPENDED SOLIDS	1400	4		V	UHSU
12191	GW03410IT	08/19/92	TOTAL SUSPENDED SOLIDS	4420	5		V	UHSU
12191	GW03910IT	10/21/92	TOTAL SUSPENDED SOLIDS	18800	5		V	UHSU
12291	GW02607IT	03/17/92	TOTAL SUSPENDED SOLIDS	610	4		V	UHSU
12291	GW02859IT	05/29/92	TOTAL SUSPENDED SOLIDS	65	4		V	UHSU
12291	GW03261IT	07/31/92	TOTAL SUSPENDED SOLIDS	36	4		V	UHSU
12391	GW02438IT	02/12/92	TOTAL SUSPENDED SOLIDS	7400	4		V	UHSU
12391	GW02887IT	05/14/92	TOTAL SUSPENDED SOLIDS	990	4		V	UHSU
12391	GW03421IT	09/15/92	TOTAL SUSPENDED SOLIDS	846	5		V	UHSU
12391	GW03919IT	12/03/92	TOTAL SUSPENDED SOLIDS	480	4		V	UHSU
12491	GW02435IT	02/07/92	TOTAL SUSPENDED SOLIDS	30000	4		V	UHSU
12491	GW02888IT	05/14/92	TOTAL SUSPENDED SOLIDS	2100	4		V	UHSU
12491	GW03422IT	09/14/92	TOTAL SUSPENDED SOLIDS	2120	5		V	UHSU
12491	GW03922IT	10/22/92	TOTAL SUSPENDED SOLIDS	1160	5		V	UHSU
12691	GW02437IT	02/13/92	TOTAL SUSPENDED SOLIDS	2200	4		V	UHSU
12691	GW02478IT	02/13/92	TOTAL SUSPENDED SOLIDS	4	4	U	V	UHSU
12691	GW02479IT	02/13/92	TOTAL SUSPENDED SOLIDS	640	4		V	UHSU
12691	GW02889IT	05/29/92	TOTAL SUSPENDED SOLIDS	220	4		V	UHSU
12691	GW03423IT	09/10/92	TOTAL SUSPENDED SOLIDS	50	5		V	UHSU
12691	GW03923IT	10/23/92	TOTAL SUSPENDED SOLIDS	80	5		V	UHSU
1287	GW01647IT	09/09/91	TOTAL SUSPENDED SOLIDS	22	4		V	UHSU
1287	GW02002IT	11/20/91	TOTAL SUSPENDED SOLIDS	8	4		V	UHSU
1287	GW02387IT	02/22/92	TOTAL SUSPENDED SOLIDS	15	4		V	UHSU
1287	GW02921IT	05/18/92	TOTAL SUSPENDED SOLIDS	34	4		V	UHSU
1287	GW03441IT	09/01/92	TOTAL SUSPENDED SOLIDS	10	5		V	UHSU
12991	GW02601IT	03/17/92	TOTAL SUSPENDED SOLIDS	520	4		V	UHSU
12991	GW02911IT	05/22/92	TOTAL SUSPENDED SOLIDS	730	4		V	UHSU
12991	GW03437IT	08/28/92	TOTAL SUSPENDED SOLIDS	994	5		V	UHSU
12991	GW03867IT	11/30/92	TOTAL SUSPENDED SOLIDS	1200	5		V	UHSU
13091	GW02912IT	05/22/92	TOTAL SUSPENDED SOLIDS	120	4		V	UHSU
13091	GW03440IT	09/09/92	TOTAL SUSPENDED SOLIDS	5	5	U	V	UHSU
13091	GW03860IT	11/16/92	TOTAL SUSPENDED SOLIDS	5	5	U	V	UHSU
13191	GW02905IT	05/19/92	TOTAL SUSPENDED SOLIDS	3200	4		V	UHSU
13191	GW03433IT	09/02/92	TOTAL SUSPENDED SOLIDS	598	5		V	UHSU
13191	GW03855IT	11/17/92	TOTAL SUSPENDED SOLIDS	310	5		V	UHSU
13291	GW02906IT	05/21/92	TOTAL SUSPENDED SOLIDS	16	4		V	UHSU
13391	GW03016IT	06/08/92	TOTAL SUSPENDED SOLIDS	2600	4		V	UHSU
13391	GW03354IT	08/20/92	TOTAL SUSPENDED SOLIDS	1550	5		V	UHSU
13391	GW03906IT	10/20/92	TOTAL SUSPENDED SOLIDS	337	5		V	UHSU
13491	GW03063IT	06/24/92	TOTAL SUSPENDED SOLIDS	4900	4		V	UHSU
13491	GW03411IT	08/21/92	TOTAL SUSPENDED SOLIDS	2610	5		V	UHSU
13491	GW03928IT	10/22/92	TOTAL SUSPENDED SOLIDS	2180	5		V	UHSU
1487	GW01093IT	04/15/91	TOTAL SUSPENDED SOLIDS	8	4		V	UHSU
1487	GW01646IT	09/05/91	TOTAL SUSPENDED SOLIDS	16	4		V	UHSU
1487	GW02003IT	11/21/91	TOTAL SUSPENDED SOLIDS	6	4		V	UHSU
1487	GW02388IT	02/21/92	TOTAL SUSPENDED SOLIDS	31	4		V	UHSU
1487	GW02922IT	05/20/92	TOTAL SUSPENDED SOLIDS	15	4		V	UHSU
1487	GW03461IT	08/31/92	TOTAL SUSPENDED SOLIDS	5	5	U	V	UHSU
1587	GW01094IT	04/15/91	TOTAL SUSPENDED SOLIDS	970	4		V	UHSU
1587	GW01650IT	09/04/91	TOTAL SUSPENDED SOLIDS	1100	4		V	UHSU
1587	GW02005IT	12/18/91	TOTAL SUSPENDED SOLIDS	1400	4		V	UHSU
1587	GW02422IT	02/25/92	TOTAL SUSPENDED SOLIDS	1200	4		V	UHSU
1587	GW02914IT	06/23/92	TOTAL SUSPENDED SOLIDS	1500	4		V	UHSU
1587	GW03442IT	09/01/92	TOTAL SUSPENDED SOLIDS	3300	5		V	UHSU
1587	GW03859IT	11/17/92	TOTAL SUSPENDED SOLIDS	2500	5		V	UHSU

TABLE D-5
TOTAL SUSPENDED SOLIDS IN UHSU GROUNDWATER

location	fieldid	date_sampled	chemical	result (mg/l)	detectionlimit	qual_lab	qual_wc	location_z
1787	GW01687IT	08/19/91	TOTAL SUSPENDED SOLIDS	58	4		V	UHSU
1787	GW02031IT	11/18/91	TOTAL SUSPENDED SOLIDS	260	4		V	UHSU
1787	GW02424IT	02/24/92	TOTAL SUSPENDED SOLIDS	180	4		V	UHSU
1787	GW02844IT	04/30/92	TOTAL SUSPENDED SOLIDS	130	4		V	UHSU
1787	GW03281IT	07/29/92	TOTAL SUSPENDED SOLIDS	81	4		V	UHSU
1787	GW03823IT	11/10/92	TOTAL SUSPENDED SOLIDS	150	5		V	UHSU
1987	GW02878IT	05/12/92	TOTAL SUSPENDED SOLIDS	10	4		V	UHSU
2187	GW01187IT	04/25/91	TOTAL SUSPENDED SOLIDS	39	4		V	UHSU
2187	GW01400IT	06/13/91	TOTAL SUSPENDED SOLIDS	40	4		V	UHSU
2187	GW01613IT	08/06/91	TOTAL SUSPENDED SOLIDS	26	4			UHSU
2187	GW01929IT	10/16/91	TOTAL SUSPENDED SOLIDS	18	4		V	UHSU
2187	GW02520IT	02/27/92	TOTAL SUSPENDED SOLIDS	28	4		V	UHSU
2187	GW03210IT	07/24/92	TOTAL SUSPENDED SOLIDS	23	4		V	UHSU
2187	GW03566IT	10/13/92	TOTAL SUSPENDED SOLIDS	11	5		V	UHSU
2387	GW01126IT	04/19/91	TOTAL SUSPENDED SOLIDS	160	4		V	UHSU
2387	GW01669IT	08/19/91	TOTAL SUSPENDED SOLIDS	180	4		V	UHSU
2387	GW02032IT	11/23/91	TOTAL SUSPENDED SOLIDS	810	4		V	UHSU
2387	GW02405IT	02/28/92	TOTAL SUSPENDED SOLIDS	760	4		V	UHSU
2387	GW02845IT	05/28/92	TOTAL SUSPENDED SOLIDS	190	4		V	UHSU
2387	GW03256IT	07/30/92	TOTAL SUSPENDED SOLIDS	170	4		V	UHSU
2387	GW03816IT	11/06/92	TOTAL SUSPENDED SOLIDS	1800	4		V	UHSU
2587	GW01176IT	04/22/91	TOTAL SUSPENDED SOLIDS	820	4		V	UHSU
2587	GW01685IT	09/10/91	TOTAL SUSPENDED SOLIDS	380	4		V	UHSU
2587	GW02039IT	11/18/91	TOTAL SUSPENDED SOLIDS	290	4		V	UHSU
2587	GW02406IT	03/03/92	TOTAL SUSPENDED SOLIDS	120	4		V	UHSU
2587	GW02865IT	05/15/92	TOTAL SUSPENDED SOLIDS	150	4		V	UHSU
2587	GW03348IT	09/22/92	TOTAL SUSPENDED SOLIDS	120	5		V	UHSU
2587	GW03912IT	10/27/92	TOTAL SUSPENDED SOLIDS	6	5		V	UHSU
2687	GW02927IT	05/19/92	TOTAL SUSPENDED SOLIDS	100	4		V	UHSU
2787	GW02933IT	05/20/92	TOTAL SUSPENDED SOLIDS	4800	4		V	UHSU
2987	GW01271IT	05/10/91	TOTAL SUSPENDED SOLIDS	510	4		V	UHSU
2987	GW01703IT	08/21/91	TOTAL SUSPENDED SOLIDS	540	4		V	UHSU
2987	GW02080IT	12/07/91	TOTAL SUSPENDED SOLIDS	220	4		V	UHSU
2987	GW02412IT	02/12/92	TOTAL SUSPENDED SOLIDS	320	4		V	UHSU
2987	GW03058IT	06/09/92	TOTAL SUSPENDED SOLIDS	1400	4		V	UHSU
2987	GW03292IT	07/31/92	TOTAL SUSPENDED SOLIDS	420	5		V	UHSU
2987	GW03730IT	10/27/92	TOTAL SUSPENDED SOLIDS	410	5		V	UHSU
3287	GW01157IT	04/16/91	TOTAL SUSPENDED SOLIDS	600	4		V	UHSU
3287	GW01642IT	09/04/91	TOTAL SUSPENDED SOLIDS	1400	4		V	UHSU
3287	GW02012IT	11/22/91	TOTAL SUSPENDED SOLIDS	1900	4		V	UHSU
3287	GW02429IT	02/25/92	TOTAL SUSPENDED SOLIDS	1100	4		V	UHSU
3287	GW02936IT	05/18/92	TOTAL SUSPENDED SOLIDS	2700	4		V	UHSU
3287	GW03447IT	09/09/92	TOTAL SUSPENDED SOLIDS	1900	5		V	UHSU
3287	GW03880IT	11/30/92	TOTAL SUSPENDED SOLIDS	900	5		V	UHSU
3387	GW02928IT	05/19/92	TOTAL SUSPENDED SOLIDS	730	4		V	UHSU
34791	GW02157IT	12/17/91	TOTAL SUSPENDED SOLIDS	290	4		V	UHSU
34791	GW02447IT	02/10/92	TOTAL SUSPENDED SOLIDS	59	4		V	UHSU
34791	GW02908IT	05/20/92	TOTAL SUSPENDED SOLIDS	150	4		V	UHSU
34791	GW03459IT	09/02/92	TOTAL SUSPENDED SOLIDS	167	5		V	UHSU
34791	GW03863IT	11/16/92	TOTAL SUSPENDED SOLIDS	110	5		V	UHSU
3586	GW01221IT	04/29/91	TOTAL SUSPENDED SOLIDS	170	4		V	UHSU
3586	GW01461IT	07/09/91	TOTAL SUSPENDED SOLIDS	54	4			UHSU
3586	GW01818IT	10/08/91	TOTAL SUSPENDED SOLIDS	160	4		V	UHSU
3586	GW02195IT	01/10/92	TOTAL SUSPENDED SOLIDS	100	4		V	UHSU
3586	GW02631IT	04/07/92	TOTAL SUSPENDED SOLIDS	62	4		V	UHSU
3586	GW03217IT	08/05/92	TOTAL SUSPENDED SOLIDS	5	5	U	V	UHSU
3586	GW03828IT	12/10/92	TOTAL SUSPENDED SOLIDS	120	4		V	UHSU

TABLE D-5
TOTAL SUSPENDED SOLIDS IN UHSU GROUNDWATER

location	fieldid	date_sampled	chemical	result (mg/l)	detectionlimit	qual_lab	qual_wc	location_z
3686	GW01222IT	04/30/91	TOTAL SUSPENDED SOLIDS	38	4		V	UHSU
3686	GW02632IT	04/08/92	TOTAL SUSPENDED SOLIDS	33	4		V	UHSU
3687	GW01162IT	04/19/91	TOTAL SUSPENDED SOLIDS	720	4		V	UHSU
3687	GW01674IT	08/23/91	TOTAL SUSPENDED SOLIDS	200	4		V	UHSU
3687	GW02036IT	11/25/91	TOTAL SUSPENDED SOLIDS	87	4		V	UHSU
3687	GW02414IT	03/05/92	TOTAL SUSPENDED SOLIDS	71	4		V	UHSU
3687	GW02852IT	05/15/92	TOTAL SUSPENDED SOLIDS	35	4		V	UHSU
3687	GW03384IT	08/17/92	TOTAL SUSPENDED SOLIDS	620	5		V	UHSU
3687	GW03924IT	10/27/92	TOTAL SUSPENDED SOLIDS	610	5		V	UHSU
3786	GW01223IT	04/30/91	TOTAL SUSPENDED SOLIDS	60	4		V	UHSU
3786	GW01521IT	07/17/91	TOTAL SUSPENDED SOLIDS	26	4		V	UHSU
3786	GW01899IT	10/15/91	TOTAL SUSPENDED SOLIDS	22	4		V	UHSU
3786	GW02656IT	04/14/92	TOTAL SUSPENDED SOLIDS	32	4		V	UHSU
3786	GW03233IT	09/18/92	TOTAL SUSPENDED SOLIDS	25	5		V	UHSU
3786	GW03641IT	10/13/92	TOTAL SUSPENDED SOLIDS	49	5		V	UHSU
3986	GW01285IT	05/14/91	TOTAL SUSPENDED SOLIDS	180	4		V	UHSU
3986	GW01592IT	08/16/91	TOTAL SUSPENDED SOLIDS	140	4		V	UHSU
3986	GW02049IT	12/05/91	TOTAL SUSPENDED SOLIDS	89	4		V	UHSU
3986	GW02241IT	01/21/92	TOTAL SUSPENDED SOLIDS	56	4		V	UHSU
3986	GW02668IT	04/16/92	TOTAL SUSPENDED SOLIDS	40	4		V	UHSU
3986	GW03328IT	09/08/92	TOTAL SUSPENDED SOLIDS	510	5		V	UHSU
3986	GW03893IT	10/19/92	TOTAL SUSPENDED SOLIDS	180	5		V	UHSU
41591	GW02091IT	12/06/91	TOTAL SUSPENDED SOLIDS	6500			V	UHSU
41591	GW02614IT	03/18/92	TOTAL SUSPENDED SOLIDS	1200	4		V	UHSU
41591	GW02952IT	06/10/92	TOTAL SUSPENDED SOLIDS	2600	5			UHSU
41591	GW03395IT	09/15/92	TOTAL SUSPENDED SOLIDS	3140	5		V	UHSU
41591	GW03811IT	11/17/92	TOTAL SUSPENDED SOLIDS	430	5		V	UHSU
41691	GW02090IT	12/07/91	TOTAL SUSPENDED SOLIDS	7000	4		V	UHSU
41691	GW02615IT	04/01/92	TOTAL SUSPENDED SOLIDS	1700	4		V	UHSU
41691	GW02953IT	06/11/92	TOTAL SUSPENDED SOLIDS	3300	5			UHSU
41691	GW03396IT	09/16/92	TOTAL SUSPENDED SOLIDS	2240	5		V	UHSU
41691	GW03806IT	11/18/92	TOTAL SUSPENDED SOLIDS	910	4		V	UHSU
4186	GW02938IT	05/19/92	TOTAL SUSPENDED SOLIDS	89	4		V	UHSU
4186	GW03449IT	09/09/92	TOTAL SUSPENDED SOLIDS	120	5		V	UHSU
4286	GW01295IT	05/17/91	TOTAL SUSPENDED SOLIDS	830	4		V	UHSU
4286	GW01706IT	09/11/91	TOTAL SUSPENDED SOLIDS	1240	4			UHSU
4286	GW02044IT	12/04/91	TOTAL SUSPENDED SOLIDS	420	4		V	UHSU
4286	GW02398IT	02/10/92	TOTAL SUSPENDED SOLIDS	1500	4		V	UHSU
4286	GW02846IT	05/29/92	TOTAL SUSPENDED SOLIDS	2200	4		V	UHSU
4286	GW03385IT	08/17/92	TOTAL SUSPENDED SOLIDS	850	5		V	UHSU
4286	GW03925IT	11/30/92	TOTAL SUSPENDED SOLIDS	150	5		V	UHSU
4386	GW01670IT	08/20/91	TOTAL SUSPENDED SOLIDS	26	4		V	UHSU
4386	GW02860IT	05/12/92	TOTAL SUSPENDED SOLIDS	35	4		V	UHSU
6286	GW01284IT	05/14/91	TOTAL SUSPENDED SOLIDS	17	4		V	UHSU
6286	GW01708IT	08/22/91	TOTAL SUSPENDED SOLIDS	25	4		V	UHSU
6286	GW02046IT	11/25/91	TOTAL SUSPENDED SOLIDS	35	4		V	UHSU
6286	GW02378IT	02/11/92	TOTAL SUSPENDED SOLIDS	13	4		V	UHSU
6286	GW03056IT	06/11/92	TOTAL SUSPENDED SOLIDS	94	5			UHSU
6286	GW03294IT	07/31/92	TOTAL SUSPENDED SOLIDS	46	4			UHSU
6286	GW03885IT	11/09/92	TOTAL SUSPENDED SOLIDS	5	5	U	V	UHSU
6386	GW01709IT	08/22/91	TOTAL SUSPENDED SOLIDS	310	4		V	UHSU
6386	GW03057IT	06/11/92	TOTAL SUSPENDED SOLIDS	130	5			UHSU
6486	GW02048IT	12/07/91	TOTAL SUSPENDED SOLIDS	10	4		V	UHSU
6486	GW02839IT	04/30/92	TOTAL SUSPENDED SOLIDS	4	4	U	V	UHSU
6586	GW01275IT	05/09/91	TOTAL SUSPENDED SOLIDS	38	4		V	UHSU
6586	GW01671IT	08/16/91	TOTAL SUSPENDED SOLIDS	30	4		V	UHSU
6586	GW02050IT	12/06/91	TOTAL SUSPENDED SOLIDS	36	4		V	UHSU

TABLE D-5
TOTAL SUSPENDED SOLIDS IN UHSU GROUNDWATER

location	fieldid	date_sampled	chemical	result (mg/l)	detectionlimit	qual_lab	qual_wc	location_z
6586	GW02326IT	01/23/92	TOTAL SUSPENDED SOLIDS	110	4		V	UHSU
6586	GW02840IT	04/30/92	TOTAL SUSPENDED SOLIDS	4	4		V	UHSU
6586	GW03308IT	08/06/92	TOTAL SUSPENDED SOLIDS	6	5		V	UHSU
6586	GW03947IT	12/14/92	TOTAL SUSPENDED SOLIDS	5	5	U	V	UHSU
B218789	GW01292IT	05/21/91	TOTAL SUSPENDED SOLIDS	62	4		V	UHSU
B218789	GW01673IT	08/20/91	TOTAL SUSPENDED SOLIDS	26	4		V	UHSU
B218789	GW02034IT	11/19/91	TOTAL SUSPENDED SOLIDS	770	4		V	UHSU
B218789	GW02419IT	02/18/92	TOTAL SUSPENDED SOLIDS	490	4		V	UHSU
B218789	GW02866IT	05/08/92	TOTAL SUSPENDED SOLIDS	110	4		V	UHSU
B218789	GW03349IT	08/21/92	TOTAL SUSPENDED SOLIDS	352	5		V	UHSU
B218789	GW03913IT	10/27/92	TOTAL SUSPENDED SOLIDS	170	5		V	UHSU

TABLE D-6
TOTAL DISSOLVED SOLIDS IN UHSU GROUNDWATER

location	fieldid	date_sampled	chemical	result (mg/l)	detectionlimit	qual_lab	qual_wc	location_z
00191	GW02596IT	03/16/92	TOTAL DISSOLVED SOLIDS	260	10		V	UHSU
00191	GW02909IT	05/21/92	TOTAL DISSOLVED SOLIDS	260	10		V	UHSU
00191	GW03435IT	09/01/92	TOTAL DISSOLVED SOLIDS	304	10		V	UHSU
00191	GW03861IT	11/18/92	TOTAL DISSOLVED SOLIDS	290	10		V	UHSU
00291	GW02581IT	03/11/92	TOTAL DISSOLVED SOLIDS	240	10		V	UHSU
00291	GW02910IT	05/21/92	TOTAL DISSOLVED SOLIDS	280	10		V	UHSU
00291	GW03436IT	09/08/92	TOTAL DISSOLVED SOLIDS	404	10		V	UHSU
00291	GW03868IT	11/30/92	TOTAL DISSOLVED SOLIDS	290	14		V	UHSU
00391	GW02158IT	12/17/91	TOTAL DISSOLVED SOLIDS	390	10		V	UHSU
00391	GW02526IT	02/28/92	TOTAL DISSOLVED SOLIDS	430	10		V	UHSU
00391	GW02915IT	05/21/92	TOTAL DISSOLVED SOLIDS	410	10		V	UHSU
00391	GW03453IT	09/08/92	TOTAL DISSOLVED SOLIDS	390	10		V	UHSU
00391	GW03888IT	11/11/92	TOTAL DISSOLVED SOLIDS	390	10		V	UHSU
00491	GW02159IT	12/18/91	TOTAL DISSOLVED SOLIDS	400	10		V	UHSU
00491	GW02527IT	02/28/92	TOTAL DISSOLVED SOLIDS	510	10		V	UHSU
00491	GW02916IT	05/20/92	TOTAL DISSOLVED SOLIDS	460	10		V	UHSU
00491	GW03462IT	09/01/92	TOTAL DISSOLVED SOLIDS	492	10		V	UHSU
00491	GW03889IT	11/09/92	TOTAL DISSOLVED SOLIDS	540	10		V	UHSU
00691	GW02918IT	05/19/92	TOTAL DISSOLVED SOLIDS	660	10		V	UHSU
01291	GW02930IT	05/21/92	TOTAL DISSOLVED SOLIDS	420	10		V	UHSU
01391	GW02857IT	05/26/92	TOTAL DISSOLVED SOLIDS	960	10		V	UHSU
01391	GW03259IT	07/30/92	TOTAL DISSOLVED SOLIDS	840	10		V	UHSU
01491	GW02597IT	03/18/92	TOTAL DISSOLVED SOLIDS	420	10		V	UHSU
01491	GW02858IT	05/15/92	TOTAL DISSOLVED SOLIDS	340	10		V	UHSU
01491	GW03260IT	07/30/92	TOTAL DISSOLVED SOLIDS	570	10		V	UHSU
01491	GW03814IT	11/19/92	TOTAL DISSOLVED SOLIDS	460	10		V	UHSU
01791	GW02173IT	12/19/91	TOTAL DISSOLVED SOLIDS	320	10		V	UHSU
01791	GW02598IT	03/17/92	TOTAL DISSOLVED SOLIDS	380	10		V	UHSU
01791	GW02871IT	05/14/92	TOTAL DISSOLVED SOLIDS	430	10		V	UHSU
01791	GW03283IT	08/03/92	TOTAL DISSOLVED SOLIDS	420	10		V	UHSU
01791	GW03817IT	11/05/92	TOTAL DISSOLVED SOLIDS	460	10		V	UHSU
01891	GW02178IT	12/23/91	TOTAL DISSOLVED SOLIDS	560	10		V	UHSU
01891	GW02509IT	02/27/92	TOTAL DISSOLVED SOLIDS	490	10		V	UHSU
01891	GW02872IT	05/13/92	TOTAL DISSOLVED SOLIDS	470	10		V	UHSU
01891	GW03284IT	07/29/92	TOTAL DISSOLVED SOLIDS	540	10		V	UHSU
01991	GW02853IT	06/04/92	TOTAL DISSOLVED SOLIDS	560	10		V	UHSU
01991	GW03350IT	09/14/92	TOTAL DISSOLVED SOLIDS	652	10		V	UHSU
01991	GW03907IT	10/23/92	TOTAL DISSOLVED SOLIDS	598	10		V	UHSU
02091	GW02138IT	12/14/91	TOTAL DISSOLVED SOLIDS	440	10		V	UHSU
02091	GW02510IT	02/26/92	TOTAL DISSOLVED SOLIDS	430	10		V	UHSU
02091	GW02873IT	05/15/92	TOTAL DISSOLVED SOLIDS	340	10		V	UHSU
02091	GW03285IT	07/31/92	TOTAL DISSOLVED SOLIDS	390	14		V	UHSU
02091	GW03819IT	11/06/92	TOTAL DISSOLVED SOLIDS	420	10		V	UHSU
02291	GW02113IT	12/16/91	TOTAL DISSOLVED SOLIDS	400	10		V	UHSU
02291	GW02511IT	02/26/92	TOTAL DISSOLVED SOLIDS	460	10		V	UHSU
02291	GW02874IT	05/14/92	TOTAL DISSOLVED SOLIDS	450	10		V	UHSU
02291	GW03286IT	07/31/92	TOTAL DISSOLVED SOLIDS	410	14		V	UHSU
02291	GW03820IT	10/29/92	TOTAL DISSOLVED SOLIDS	388	10		V	UHSU
02491	GW02114IT	12/16/91	TOTAL DISSOLVED SOLIDS	440	10		V	UHSU
02491	GW02572IT	03/11/92	TOTAL DISSOLVED SOLIDS	450	10		V	UHSU
02491	GW02875IT	05/15/92	TOTAL DISSOLVED SOLIDS	350	10		V	UHSU
02491	GW03287IT	07/31/92	TOTAL DISSOLVED SOLIDS	500	14		V	UHSU
02491	GW03821IT	11/09/92	TOTAL DISSOLVED SOLIDS	460	10		V	UHSU
02591	GW03015IT	06/09/92	TOTAL DISSOLVED SOLIDS	270	10		V	UHSU
02591	GW03314IT	08/11/92	TOTAL DISSOLVED SOLIDS	468	10		V	UHSU
02591	GW03904IT	10/20/92	TOTAL DISSOLVED SOLIDS	398	10		V	UHSU
0286	GW01454IT	06/19/91	TOTAL DISSOLVED SOLIDS	840	10			UHSU

TABLE D-6
TOTAL DISSOLVED SOLIDS IN UHSU GROUNDWATER

location	fieldid	date_sampled	chemical	result (mg/l)	detectionlimit	qual_lab	qual_wc	location_z
0286	GW02611IT	03/18/92	TOTAL DISSOLVED SOLIDS	730	10		V	UHSU
0286	GW02955IT	06/10/92	TOTAL DISSOLVED SOLIDS	1100	5			UHSU
02991	GW02441IT	03/12/92	TOTAL DISSOLVED SOLIDS	450	10		V	UHSU
02991	GW02854IT	05/08/92	TOTAL DISSOLVED SOLIDS	410	10		V	UHSU
02991	GW03351IT	08/21/92	TOTAL DISSOLVED SOLIDS	532	10		V	UHSU
02991	GW03908IT	10/20/92	TOTAL DISSOLVED SOLIDS	524	10		V	UHSU
03091	GW02134IT	12/14/91	TOTAL DISSOLVED SOLIDS	310	10		V	UHSU
03091	GW02568IT	03/05/92	TOTAL DISSOLVED SOLIDS	300	10		V	UHSU
03091	GW02881IT	05/12/92	TOTAL DISSOLVED SOLIDS	280	10		V	UHSU
03091	GW03409IT	08/19/92	TOTAL DISSOLVED SOLIDS	498	10		V	UHSU
03091	GW03914IT	10/22/92	TOTAL DISSOLVED SOLIDS	340	10		V	UHSU
03191	GW02156IT	12/19/91	TOTAL DISSOLVED SOLIDS	380	10		V	UHSU
03191	GW02165IT	12/18/91	TOTAL DISSOLVED SOLIDS	160	10		JA	UHSU
03191	GW02882IT	05/12/92	TOTAL DISSOLVED SOLIDS	200	10		V	UHSU
03391	GW02092IT	12/05/91	TOTAL DISSOLVED SOLIDS	400	10		V	UHSU
03391	GW02547IT	03/13/92	TOTAL DISSOLVED SOLIDS	400	10		V	UHSU
03391	GW03006IT	06/02/92	TOTAL DISSOLVED SOLIDS	330	10		V	UHSU
03391	GW03123IT	07/09/92	TOTAL DISSOLVED SOLIDS	550	10		V	UHSU
03391	GW03896IT	10/16/92	TOTAL DISSOLVED SOLIDS	474	10		V	UHSU
03591	GW02161IT	12/19/91	TOTAL DISSOLVED SOLIDS	430	10		V	UHSU
03591	GW02567IT	03/05/92	TOTAL DISSOLVED SOLIDS	520	10		V	UHSU
03591	GW02883IT	06/04/92	TOTAL DISSOLVED SOLIDS	500	10		V	UHSU
03591	GW03387IT	08/13/92	TOTAL DISSOLVED SOLIDS	574	10		V	UHSU
03591	GW03916IT	10/23/92	TOTAL DISSOLVED SOLIDS	648	10		V	UHSU
03691	GW03048IT	06/08/92	TOTAL DISSOLVED SOLIDS	240	10		V	UHSU
03691	GW03124IT	07/08/92	TOTAL DISSOLVED SOLIDS	420	10		V	UHSU
03691	GW03897IT	10/21/92	TOTAL DISSOLVED SOLIDS	448	10		V	UHSU
03791	GW02093IT	12/06/91	TOTAL DISSOLVED SOLIDS	490	10		V	UHSU
03791	GW02557IT	03/19/92	TOTAL DISSOLVED SOLIDS	460	10		V	UHSU
03791	GW03007IT	06/10/92	TOTAL DISSOLVED SOLIDS	580	6			UHSU
03791	GW03125IT	07/10/92	TOTAL DISSOLVED SOLIDS	470	10		V	UHSU
03791	GW03898IT	10/16/92	TOTAL DISSOLVED SOLIDS	558	10		V	UHSU
0386	GW01455IT	06/20/91	TOTAL DISSOLVED SOLIDS	560	10		V	UHSU
0386	GW01762IT	09/11/91	TOTAL DISSOLVED SOLIDS	594	10			UHSU
0386	GW02026IT	11/13/91	TOTAL DISSOLVED SOLIDS	580	10		V	UHSU
0386	GW02612IT	04/01/92	TOTAL DISSOLVED SOLIDS	560	10		V	UHSU
0386	GW02956IT	06/12/92	TOTAL DISSOLVED SOLIDS	550	5			UHSU
0386	GW03392IT	09/16/92	TOTAL DISSOLVED SOLIDS	570	14		V	UHSU
0386	GW03810IT	11/17/92	TOTAL DISSOLVED SOLIDS	600	14		V	UHSU
03991	GW03010IT	06/23/92	TOTAL DISSOLVED SOLIDS	400	10		V	UHSU
03991	GW03126IT	07/08/92	TOTAL DISSOLVED SOLIDS	410	10		V	UHSU
03991	GW03899IT	10/21/92	TOTAL DISSOLVED SOLIDS	410	10		V	UHSU
04091	GW03013IT	06/24/92	TOTAL DISSOLVED SOLIDS	300	10		V	UHSU
04091	GW03317IT	08/12/92	TOTAL DISSOLVED SOLIDS	332	10		V	UHSU
04091	GW03902IT	10/22/92	TOTAL DISSOLVED SOLIDS	146	10		V	UHSU
04191	GW02923IT	05/19/92	TOTAL DISSOLVED SOLIDS	340	10		V	UHSU
04191	GW03319IT	08/27/92	TOTAL DISSOLVED SOLIDS	412	10		V	UHSU
04291	GW02924IT	05/19/92	TOTAL DISSOLVED SOLIDS	340	10		V	UHSU
04491	GW03321IT	09/02/92	TOTAL DISSOLVED SOLIDS	328	10		V	UHSU
04591	GW02175IT	12/20/91	TOTAL DISSOLVED SOLIDS	690	10		V	UHSU
04591	GW02525IT	03/03/92	TOTAL DISSOLVED SOLIDS	470	10		V	UHSU
04591	GW02931IT	05/22/92	TOTAL DISSOLVED SOLIDS	470	10		V	UHSU
04591	GW03450IT	08/31/92	TOTAL DISSOLVED SOLIDS	518	10		V	UHSU
04591	GW03882IT	12/08/92	TOTAL DISSOLVED SOLIDS	390	14		V	UHSU
04691	GW03451IT	09/02/92	TOTAL DISSOLVED SOLIDS	490	10		V	UHSU
04891	GW03235IT	08/19/92	TOTAL DISSOLVED SOLIDS	734	10		V	UHSU
04991	GW02939IT	05/21/92	TOTAL DISSOLVED SOLIDS	510	10		V	UHSU

TABLE D-6
TOTAL DISSOLVED SOLIDS IN UHSU GROUNDWATER

location	fieldid	date_sampled	chemical	result (mg/l)	detectionlimit	qual_lab	qual_wc	location_z
04991	GW03236IT	07/27/92	TOTAL DISSOLVED SOLIDS	590	10		V	UHSU
04991	GW03725IT	10/28/92	TOTAL DISSOLVED SOLIDS	530	10		V	UHSU
05091	GW02177IT	12/23/91	TOTAL DISSOLVED SOLIDS	540	10		V	UHSU
05091	GW02570IT	03/06/92	TOTAL DISSOLVED SOLIDS	540	10		JA	UHSU
05091	GW02619IT	03/26/92	TOTAL DISSOLVED SOLIDS	500	10		V	UHSU
05091	GW02940IT	05/20/92	TOTAL DISSOLVED SOLIDS	480	10		V	UHSU
05091	GW03237IT	07/28/92	TOTAL DISSOLVED SOLIDS	530	10		V	UHSU
05091	GW03726IT	10/28/92	TOTAL DISSOLVED SOLIDS	530	10		V	UHSU
05191	GW02160IT	12/17/91	TOTAL DISSOLVED SOLIDS	450	10		V	UHSU
05191	GW02571IT	03/05/92	TOTAL DISSOLVED SOLIDS	430	10		V	UHSU
05191	GW02941IT	05/21/92	TOTAL DISSOLVED SOLIDS	490	10		V	UHSU
05191	GW03238IT	07/24/92	TOTAL DISSOLVED SOLIDS	500	10		V	UHSU
05191	GW03727IT	10/28/92	TOTAL DISSOLVED SOLIDS	510	10		V	UHSU
05391	GW02084IT	12/05/91	TOTAL DISSOLVED SOLIDS	380	10		V	UHSU
05391	GW02566IT	03/05/92	TOTAL DISSOLVED SOLIDS	460	10		V	UHSU
05391	GW02884IT	06/11/92	TOTAL DISSOLVED SOLIDS	450	6			UHSU
05391	GW03388IT	09/10/92	TOTAL DISSOLVED SOLIDS	320	10		V	UHSU
05391	GW03917IT	10/28/92	TOTAL DISSOLVED SOLIDS	410	10		V	UHSU
05691	GW02061IT	12/04/91	TOTAL DISSOLVED SOLIDS	440	10		V	UHSU
05691	GW02549IT	03/12/92	TOTAL DISSOLVED SOLIDS	450	10		V	UHSU
05691	GW02885IT	05/28/92	TOTAL DISSOLVED SOLIDS	480	10		V	UHSU
05691	GW03389IT	08/21/92	TOTAL DISSOLVED SOLIDS	508	10		V	UHSU
05691	GW03918IT	11/09/92	TOTAL DISSOLVED SOLIDS	530	10		V	UHSU
06091	GW02062IT	12/04/91	TOTAL DISSOLVED SOLIDS	480	10		V	UHSU
06091	GW02576IT	03/12/92	TOTAL DISSOLVED SOLIDS	430	10		V	UHSU
06091	GW03014IT	06/11/92	TOTAL DISSOLVED SOLIDS	520	6			UHSU
06091	GW03318IT	08/06/92	TOTAL DISSOLVED SOLIDS	502	10		V	UHSU
06091	GW03903IT	10/19/92	TOTAL DISSOLVED SOLIDS	588	10		V	UHSU
06191	GW03352IT	08/14/92	TOTAL DISSOLVED SOLIDS	474	10		V	UHSU
06191	GW03905IT	10/20/92	TOTAL DISSOLVED SOLIDS	426	10		V	UHSU
06291	GW03329IT	09/03/92	TOTAL DISSOLVED SOLIDS	378	10		V	UHSU
06491	GW02616IT	04/01/92	TOTAL DISSOLVED SOLIDS	2200	10		V	UHSU
06491	GW03049IT	06/22/92	TOTAL DISSOLVED SOLIDS	1500	10		V	UHSU
06491	GW03375IT	09/10/92	TOTAL DISSOLVED SOLIDS	1410	10		V	UHSU
06491	GW03808IT	11/13/92	TOTAL DISSOLVED SOLIDS	1500	10		V	UHSU
06591	GW02895IT	05/19/92	TOTAL DISSOLVED SOLIDS	220	10		V	UHSU
06591	GW03427IT	08/27/92	TOTAL DISSOLVED SOLIDS	464	10		V	UHSU
06591	GW03847IT	11/17/92	TOTAL DISSOLVED SOLIDS	340	14		V	UHSU
06691	GW02896IT	05/18/92	TOTAL DISSOLVED SOLIDS	1000	10		V	UHSU
06691	GW03428IT	08/28/92	TOTAL DISSOLVED SOLIDS	958	10		V	UHSU
06691	GW03848IT	11/17/92	TOTAL DISSOLVED SOLIDS	890	14		V	UHSU
06791	GW02897IT	05/20/92	TOTAL DISSOLVED SOLIDS	280	10		V	UHSU
06891	GW02898IT	05/20/92	TOTAL DISSOLVED SOLIDS	250	10		V	UHSU
06891	GW03429IT	08/26/92	TOTAL DISSOLVED SOLIDS	410	10		V	UHSU
06891	GW03851IT	11/18/92	TOTAL DISSOLVED SOLIDS	350	10		V	UHSU
06991	GW02899IT	05/18/92	TOTAL DISSOLVED SOLIDS	250	10		V	UHSU
06991	GW03430IT	08/26/92	TOTAL DISSOLVED SOLIDS	448	10		V	UHSU
06991	GW03850IT	11/18/92	TOTAL DISSOLVED SOLIDS	290	10		V	UHSU
07191	GW02900IT	05/18/92	TOTAL DISSOLVED SOLIDS	210	10		V	UHSU
07191	GW03455IT	08/27/92	TOTAL DISSOLVED SOLIDS	388	10		V	UHSU
07191	GW03864IT	11/16/92	TOTAL DISSOLVED SOLIDS	400	14		V	UHSU
07291	GW02901IT	05/20/92	TOTAL DISSOLVED SOLIDS	300	10		V	UHSU
07291	GW03857IT	11/16/92	TOTAL DISSOLVED SOLIDS	430	14		V	UHSU
07391	GW02599IT	03/16/92	TOTAL DISSOLVED SOLIDS	3200	10		V	UHSU
07391	GW02902IT	05/21/92	TOTAL DISSOLVED SOLIDS	3800	10		V	UHSU
07391	GW03457IT	08/28/92	TOTAL DISSOLVED SOLIDS	419	10		V	UHSU
07391	GW03862IT	11/16/92	TOTAL DISSOLVED SOLIDS	3100	14		V	UHSU

TABLE D-6
TOTAL DISSOLVED SOLIDS IN UHSU GROUNDWATER

location	fieldid	date_sampled	chemical	result (mg/l)	detectionlimit	qual_lab	qual_wc	location_z
07891	GW02434IT	03/12/92	TOTAL DISSOLVED SOLIDS	530	10		V	UHSU
07891	GW02855IT	05/07/92	TOTAL DISSOLVED SOLIDS	390	10		V	UHSU
07891	GW03353IT	08/20/92	TOTAL DISSOLVED SOLIDS	616	10		V	UHSU
07891	GW03909IT	10/23/92	TOTAL DISSOLVED SOLIDS	586	10		V	UHSU
07991	GW02925IT	05/20/92	TOTAL DISSOLVED SOLIDS	440	10		V	UHSU
07991	GW03322IT	08/26/92	TOTAL DISSOLVED SOLIDS	588	10		V	UHSU
07991	GW03874IT	12/04/92	TOTAL DISSOLVED SOLIDS	540	10		V	UHSU
08091	GW02926IT	05/19/92	TOTAL DISSOLVED SOLIDS	390	10		V	UHSU
08891	GW03065IT	06/23/92	TOTAL DISSOLVED SOLIDS	540	10		V	UHSU
08891	GW03431IT	08/31/92	TOTAL DISSOLVED SOLIDS	584	10		V	UHSU
08891	GW03849IT	11/17/92	TOTAL DISSOLVED SOLIDS	570	14		V	UHSU
09091	GW02903IT	05/20/92	TOTAL DISSOLVED SOLIDS	270	10		V	UHSU
09091	GW03432IT	08/31/92	TOTAL DISSOLVED SOLIDS	488	10		V	UHSU
09091	GW03852IT	11/18/92	TOTAL DISSOLVED SOLIDS	440	10		V	UHSU
09691	GW02608IT	03/18/92	TOTAL DISSOLVED SOLIDS	420	10		V	UHSU
09691	GW02904IT	05/22/92	TOTAL DISSOLVED SOLIDS	480	10		V	UHSU
09691	GW03458IT	08/31/92	TOTAL DISSOLVED SOLIDS	540	10		V	UHSU
09691	GW03865IT	11/17/92	TOTAL DISSOLVED SOLIDS	690	14		V	UHSU
0987	GW01297IT	05/15/91	TOTAL DISSOLVED SOLIDS	340	10		V	UHSU
0987	GW01667IT	08/16/91	TOTAL DISSOLVED SOLIDS	340	10		V	UHSU
0987	GW02088IT	12/16/91	TOTAL DISSOLVED SOLIDS	310	10		V	UHSU
0987	GW02402IT	03/06/92	TOTAL DISSOLVED SOLIDS	320	10		V	UHSU
0987	GW02942IT	05/26/92	TOTAL DISSOLVED SOLIDS	320	10		V	UHSU
0987	GW03179IT	07/16/92	TOTAL DISSOLVED SOLIDS	340	10		V	UHSU
0987	GW03708IT	12/10/92	TOTAL DISSOLVED SOLIDS	360	10		V	UHSU
1087	GW02919IT	05/26/92	TOTAL DISSOLVED SOLIDS	810	10		V	UHSU
10991	GW02436IT	02/06/92	TOTAL DISSOLVED SOLIDS	500	10		V	UHSU
10991	GW02943IT	05/22/92	TOTAL DISSOLVED SOLIDS	410	10		V	UHSU
10991	GW03289IT	07/28/92	TOTAL DISSOLVED SOLIDS	430	10		V	UHSU
10991	GW03728IT	10/23/92	TOTAL DISSOLVED SOLIDS	326	10		V	UHSU
11491	GW02886IT	05/28/92	TOTAL DISSOLVED SOLIDS	430	10		V	UHSU
11691	GW02174IT	12/23/91	TOTAL DISSOLVED SOLIDS	620	10		V	UHSU
11691	GW02551IT	03/18/92	TOTAL DISSOLVED SOLIDS	350	10		V	UHSU
11691	GW03011IT	06/08/92	TOTAL DISSOLVED SOLIDS	360	10		V	UHSU
11691	GW03127IT	07/10/92	TOTAL DISSOLVED SOLIDS	410	10		V	UHSU
11691	GW03900IT	10/20/92	TOTAL DISSOLVED SOLIDS	420	10		V	UHSU
11791	GW02432IT	02/06/92	TOTAL DISSOLVED SOLIDS	490	10		V	UHSU
11791	GW02917IT	05/20/92	TOTAL DISSOLVED SOLIDS	370	10		V	UHSU
11791	GW03465IT	09/08/92	TOTAL DISSOLVED SOLIDS	472	10		V	UHSU
11791	GW03890IT	11/11/92	TOTAL DISSOLVED SOLIDS	440	10		V	UHSU
11791	GW03891IT	11/12/92	TOTAL DISSOLVED SOLIDS	470	14		V	UHSU
1187	GW01090IT	04/17/91	TOTAL DISSOLVED SOLIDS	540	10		V	UHSU
1187	GW01648IT	09/06/91	TOTAL DISSOLVED SOLIDS	673	10		V	UHSU
1187	GW02004IT	11/21/91	TOTAL DISSOLVED SOLIDS	560	10		V	UHSU
1187	GW02386IT	02/22/92	TOTAL DISSOLVED SOLIDS	660	10		V	UHSU
1187	GW02920IT	05/19/92	TOTAL DISSOLVED SOLIDS	540	10		V	UHSU
1187	GW03460IT	09/01/92	TOTAL DISSOLVED SOLIDS	560	14		V	UHSU
1187	GW03887IT	11/19/92	TOTAL DISSOLVED SOLIDS	550	10		V	UHSU
11891	GW02117IT	12/19/91	TOTAL DISSOLVED SOLIDS	420	10		V	UHSU
11891	GW02552IT	02/28/92	TOTAL DISSOLVED SOLIDS	460	10		V	UHSU
11891	GW03012IT	06/02/92	TOTAL DISSOLVED SOLIDS	410	10		V	UHSU
11891	GW03128IT	07/09/92	TOTAL DISSOLVED SOLIDS	410	10		V	UHSU
11891	GW03901IT	10/16/92	TOTAL DISSOLVED SOLIDS	486	10		V	UHSU
12091	GW02116IT	12/19/91	TOTAL DISSOLVED SOLIDS	430	10		V	UHSU
12091	GW02514IT	02/27/92	TOTAL DISSOLVED SOLIDS	460	10		V	UHSU
12091	GW02876IT	05/13/92	TOTAL DISSOLVED SOLIDS	490	10		V	UHSU
12091	GW03290IT	07/29/92	TOTAL DISSOLVED SOLIDS	510	10		V	UHSU

TABLE D-6
TOTAL DISSOLVED SOLIDS IN UHSU GROUNDWATER

location	fieldid	date_sampled	chemical	result (mg/l)	detectionlimit	qual_lab	qual_wc	location_z
12091	GW03822IT	11/10/92	TOTAL DISSOLVED SOLIDS	430	10		V	UHSU
12191	GW02440IT	03/16/92	TOTAL DISSOLVED SOLIDS	500	10		V	UHSU
12191	GW02862IT	06/03/92	TOTAL DISSOLVED SOLIDS	450	10		V	UHSU
12191	GW03410IT	08/19/92	TOTAL DISSOLVED SOLIDS	664	10		V	UHSU
12191	GW03910IT	10/21/92	TOTAL DISSOLVED SOLIDS	362	10		V	UHSU
12291	GW02607IT	03/17/92	TOTAL DISSOLVED SOLIDS	420	10		V	UHSU
12291	GW02859IT	05/29/92	TOTAL DISSOLVED SOLIDS	380	10		V	UHSU
12291	GW03261IT	07/31/92	TOTAL DISSOLVED SOLIDS	390	10		V	UHSU
12391	GW02438IT	02/12/92	TOTAL DISSOLVED SOLIDS	390	10		V	UHSU
12391	GW02887IT	05/14/92	TOTAL DISSOLVED SOLIDS	390	10		V	UHSU
12391	GW03421IT	09/15/92	TOTAL DISSOLVED SOLIDS	488	10		V	UHSU
12391	GW03919IT	12/03/92	TOTAL DISSOLVED SOLIDS	390	10		V	UHSU
12491	GW02435IT	02/07/92	TOTAL DISSOLVED SOLIDS	440	10		V	UHSU
12491	GW02888IT	05/14/92	TOTAL DISSOLVED SOLIDS	280	10		V	UHSU
12491	GW03422IT	09/14/92	TOTAL DISSOLVED SOLIDS	322	10		V	UHSU
12491	GW03922IT	10/22/92	TOTAL DISSOLVED SOLIDS	294	10		V	UHSU
12691	GW02437IT	02/13/92	TOTAL DISSOLVED SOLIDS	480	10		V	UHSU
12691	GW02889IT	05/29/92	TOTAL DISSOLVED SOLIDS	540	10		V	UHSU
12691	GW03423IT	09/10/92	TOTAL DISSOLVED SOLIDS	466	10		V	UHSU
12691	GW03923IT	10/23/92	TOTAL DISSOLVED SOLIDS	466	10		V	UHSU
1287	GW01647IT	09/09/91	TOTAL DISSOLVED SOLIDS	554	10		V	UHSU
1287	GW02002IT	11/20/91	TOTAL DISSOLVED SOLIDS	530	10		V	UHSU
1287	GW02387IT	02/22/92	TOTAL DISSOLVED SOLIDS	500	10		V	UHSU
1287	GW02921IT	05/18/92	TOTAL DISSOLVED SOLIDS	500	10		V	UHSU
1287	GW03441IT	09/01/92	TOTAL DISSOLVED SOLIDS	540	14		V	UHSU
12991	GW02601IT	03/17/92	TOTAL DISSOLVED SOLIDS	350	10		V	UHSU
12991	GW02911IT	05/22/92	TOTAL DISSOLVED SOLIDS	340	10		V	UHSU
12991	GW03437IT	08/28/92	TOTAL DISSOLVED SOLIDS	458	10		V	UHSU
12991	GW03867IT	11/30/92	TOTAL DISSOLVED SOLIDS	360	14		V	UHSU
13091	GW02912IT	05/22/92	TOTAL DISSOLVED SOLIDS	230	10		V	UHSU
13091	GW03440IT	09/09/92	TOTAL DISSOLVED SOLIDS	280	10		V	UHSU
13091	GW03860IT	11/16/92	TOTAL DISSOLVED SOLIDS	370	14		V	UHSU
13191	GW02905IT	05/19/92	TOTAL DISSOLVED SOLIDS	300	10		V	UHSU
13191	GW03433IT	09/02/92	TOTAL DISSOLVED SOLIDS	410	10		V	UHSU
13191	GW03855IT	11/17/92	TOTAL DISSOLVED SOLIDS	530	14		V	UHSU
13291	GW02906IT	05/21/92	TOTAL DISSOLVED SOLIDS	270	10		V	UHSU
13391	GW03016IT	06/08/92	TOTAL DISSOLVED SOLIDS	340	10		V	UHSU
13391	GW03354IT	08/20/92	TOTAL DISSOLVED SOLIDS	472	10		V	UHSU
13391	GW03906IT	10/20/92	TOTAL DISSOLVED SOLIDS	454	10		V	UHSU
13491	GW03063IT	06/24/92	TOTAL DISSOLVED SOLIDS	350	10		V	UHSU
13491	GW03411IT	08/21/92	TOTAL DISSOLVED SOLIDS	492	10		V	UHSU
13491	GW03928IT	10/22/92	TOTAL DISSOLVED SOLIDS	564	10		V	UHSU
1487	GW01093IT	04/15/91	TOTAL DISSOLVED SOLIDS	410	10		V	UHSU
1487	GW01646IT	09/05/91	TOTAL DISSOLVED SOLIDS	440	10		V	UHSU
1487	GW02003IT	11/21/91	TOTAL DISSOLVED SOLIDS	420	10		V	UHSU
1487	GW02388IT	02/21/92	TOTAL DISSOLVED SOLIDS	420	10		V	UHSU
1487	GW02922IT	05/20/92	TOTAL DISSOLVED SOLIDS	420	10		V	UHSU
1487	GW03461IT	08/31/92	TOTAL DISSOLVED SOLIDS	460	14		V	UHSU
1587	GW01094IT	04/15/91	TOTAL DISSOLVED SOLIDS	410	10		V	UHSU
1587	GW01650IT	09/04/91	TOTAL DISSOLVED SOLIDS	310	10		V	UHSU
1587	GW02005IT	12/18/91	TOTAL DISSOLVED SOLIDS	400	10		V	UHSU
1587	GW02422IT	02/25/92	TOTAL DISSOLVED SOLIDS	460	10		V	UHSU
1587	GW02914IT	06/23/92	TOTAL DISSOLVED SOLIDS	240	10		V	UHSU
1587	GW03442IT	09/01/92	TOTAL DISSOLVED SOLIDS	450	14		V	UHSU
1587	GW03859IT	11/17/92	TOTAL DISSOLVED SOLIDS	490	14		V	UHSU
1787	GW01687IT	08/19/91	TOTAL DISSOLVED SOLIDS	450	10		V	UHSU
1787	GW02031IT	11/18/91	TOTAL DISSOLVED SOLIDS	480	10		V	UHSU

TABLE D-6
TOTAL DISSOLVED SOLIDS IN UHSU GROUNDWATER

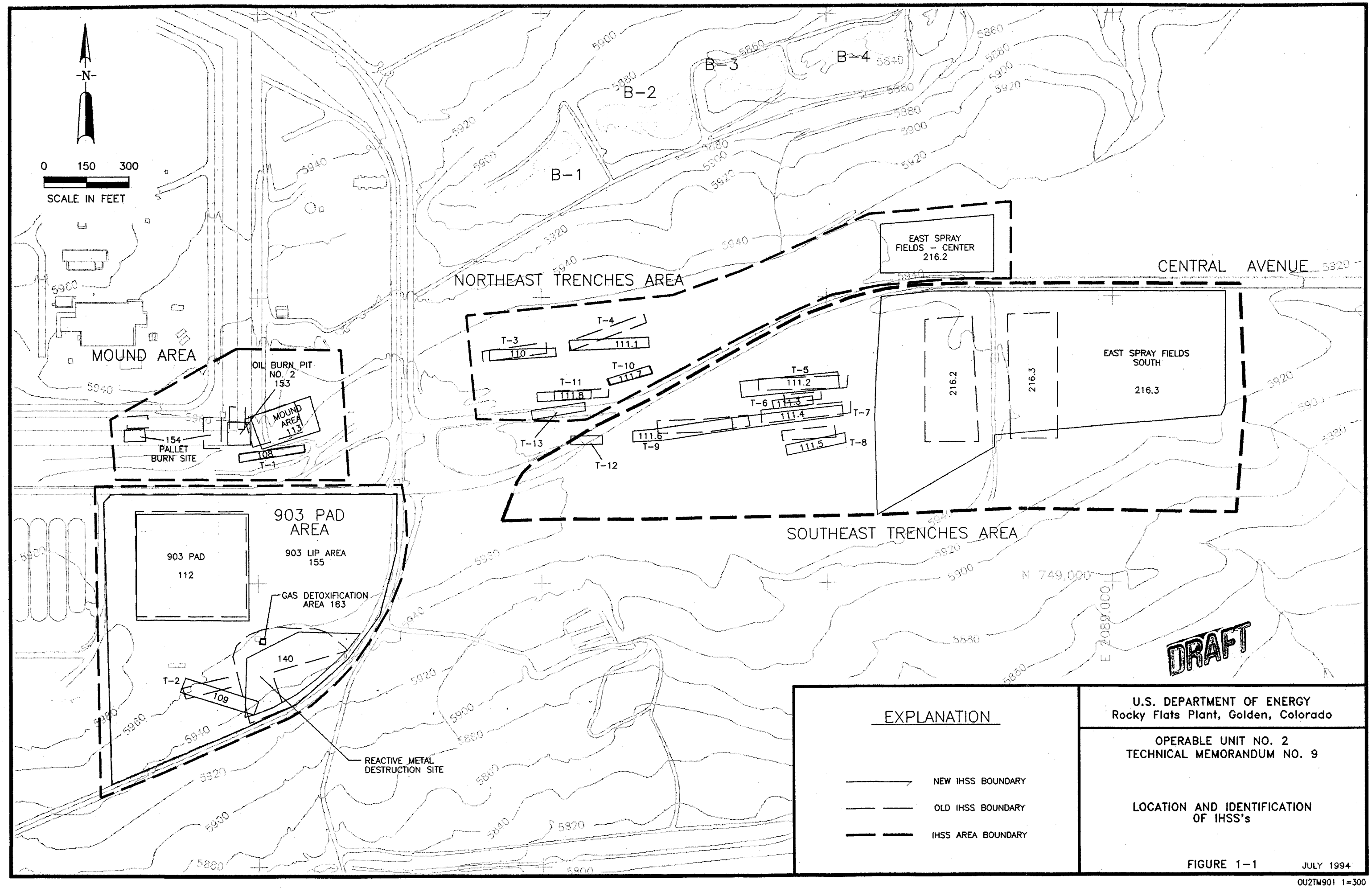
location	fieldid	date_sampled	chemical	result (mg/l)	detectionlimit	qual_lab	qual_wc	location_z
1787	GW02424IT	02/24/92	TOTAL DISSOLVED SOLIDS	460	10		V	UHSU
1787	GW02844IT	04/30/92	TOTAL DISSOLVED SOLIDS	430	10		V	UHSU
1787	GW03281IT	07/29/92	TOTAL DISSOLVED SOLIDS	460	10		V	UHSU
1787	GW03823IT	11/10/92	TOTAL DISSOLVED SOLIDS	420	14		V	UHSU
1987	GW02878IT	05/12/92	TOTAL DISSOLVED SOLIDS	280	10		V	UHSU
2187	GW01187IT	04/25/91	TOTAL DISSOLVED SOLIDS	2000	10		V	UHSU
2187	GW01400IT	06/13/91	TOTAL DISSOLVED SOLIDS	2000	10		V	UHSU
2187	GW01613IT	08/06/91	TOTAL DISSOLVED SOLIDS	1900	10			UHSU
2187	GW01929IT	10/16/91	TOTAL DISSOLVED SOLIDS	2000	10		V	UHSU
2187	GW02520IT	02/27/92	TOTAL DISSOLVED SOLIDS	2100	10		V	UHSU
2187	GW03210IT	07/24/92	TOTAL DISSOLVED SOLIDS	2000	10		V	UHSU
2187	GW03566IT	10/13/92	TOTAL DISSOLVED SOLIDS	2000	14		V	UHSU
2387	GW01126IT	04/19/91	TOTAL DISSOLVED SOLIDS	470	10		V	UHSU
2387	GW01669IT	08/19/91	TOTAL DISSOLVED SOLIDS	490	10		V	UHSU
2387	GW02032IT	11/23/91	TOTAL DISSOLVED SOLIDS	460	10		V	UHSU
2387	GW02405IT	02/28/92	TOTAL DISSOLVED SOLIDS	530	10		V	UHSU
2387	GW02845IT	05/28/92	TOTAL DISSOLVED SOLIDS	440	10		V	UHSU
2387	GW03256IT	07/30/92	TOTAL DISSOLVED SOLIDS	520	10		V	UHSU
2387	GW03816IT	11/06/92	TOTAL DISSOLVED SOLIDS	560	10		V	UHSU
2587	GW01176IT	04/22/91	TOTAL DISSOLVED SOLIDS	500	10		V	UHSU
2587	GW01685IT	09/10/91	TOTAL DISSOLVED SOLIDS	590	10		V	UHSU
2587	GW02039IT	11/18/91	TOTAL DISSOLVED SOLIDS	490	10		V	UHSU
2587	GW02406IT	03/03/92	TOTAL DISSOLVED SOLIDS	480	10		V	UHSU
2587	GW02865IT	05/15/92	TOTAL DISSOLVED SOLIDS	420	10		V	UHSU
2587	GW03348IT	09/22/92	TOTAL DISSOLVED SOLIDS	180	14		V	UHSU
2587	GW03912IT	10/27/92	TOTAL DISSOLVED SOLIDS	490	14		V	UHSU
2687	GW02927IT	05/19/92	TOTAL DISSOLVED SOLIDS	350	10		V	UHSU
2787	GW02933IT	05/20/92	TOTAL DISSOLVED SOLIDS	320	10		V	UHSU
2987	GW01271IT	05/10/91	TOTAL DISSOLVED SOLIDS	1300	10		V	UHSU
2987	GW01703IT	08/21/91	TOTAL DISSOLVED SOLIDS	1300	10		V	UHSU
2987	GW02080IT	12/07/91	TOTAL DISSOLVED SOLIDS	1200	10		V	UHSU
2987	GW02412IT	02/12/92	TOTAL DISSOLVED SOLIDS	920	10		V	UHSU
2987	GW03058IT	06/09/92	TOTAL DISSOLVED SOLIDS	1300	10		V	UHSU
2987	GW03292IT	07/31/92	TOTAL DISSOLVED SOLIDS	1500	14		V	UHSU
2987	GW03730IT	10/27/92	TOTAL DISSOLVED SOLIDS	1900	14		V	UHSU
3287	GW01157IT	04/16/91	TOTAL DISSOLVED SOLIDS	440	10		V	UHSU
3287	GW01642IT	09/04/91	TOTAL DISSOLVED SOLIDS	450	10		V	UHSU
3287	GW02012IT	11/22/91	TOTAL DISSOLVED SOLIDS	470	10		V	UHSU
3287	GW02429IT	02/25/92	TOTAL DISSOLVED SOLIDS	440	10		V	UHSU
3287	GW02936IT	05/18/92	TOTAL DISSOLVED SOLIDS	440	10		V	UHSU
3287	GW03447IT	09/09/92	TOTAL DISSOLVED SOLIDS	510	14		V	UHSU
3287	GW03880IT	11/30/92	TOTAL DISSOLVED SOLIDS	470	14		V	UHSU
3387	GW02928IT	05/19/92	TOTAL DISSOLVED SOLIDS	500	10		V	UHSU
34791	GW02157IT	12/17/91	TOTAL DISSOLVED SOLIDS	1000	10		V	UHSU
34791	GW02447IT	02/10/92	TOTAL DISSOLVED SOLIDS	1000	10		V	UHSU
34791	GW02908IT	05/20/92	TOTAL DISSOLVED SOLIDS	820	10		V	UHSU
34791	GW03459IT	09/02/92	TOTAL DISSOLVED SOLIDS	930	10		V	UHSU
34791	GW03863IT	11/16/92	TOTAL DISSOLVED SOLIDS	710	14		V	UHSU
3586	GW01221IT	04/29/91	TOTAL DISSOLVED SOLIDS	920	10		V	UHSU
3586	GW01461IT	07/09/91	TOTAL DISSOLVED SOLIDS	950	10			UHSU
3586	GW01818IT	10/08/91	TOTAL DISSOLVED SOLIDS	980	10		V	UHSU
3586	GW02195IT	01/10/92	TOTAL DISSOLVED SOLIDS	920	10		V	UHSU
3586	GW02631IT	04/07/92	TOTAL DISSOLVED SOLIDS	1000	10		V	UHSU
3586	GW03217IT	08/05/92	TOTAL DISSOLVED SOLIDS	1000	14		V	UHSU
3586	GW03828IT	12/10/92	TOTAL DISSOLVED SOLIDS	950	10		V	UHSU
3686	GW01222IT	04/30/91	TOTAL DISSOLVED SOLIDS	1400	10		V	UHSU
3686	GW02632IT	04/08/92	TOTAL DISSOLVED SOLIDS	1200	10		V	UHSU

TABLE D-6
TOTAL DISSOLVED SOLIDS IN UHSU GROUNDWATER

location	fieldid	date_sampled	chemical	result (mg/l)	detectionlimit	qual_lab	qual_wc	location_z
3687	GW01162IT	04/19/91	TOTAL DISSOLVED SOLIDS	490	10		V	UHSU
3687	GW01674IT	08/23/91	TOTAL DISSOLVED SOLIDS	500	10		V	UHSU
3687	GW02036IT	11/25/91	TOTAL DISSOLVED SOLIDS	480	10		V	UHSU
3687	GW02414IT	03/05/92	TOTAL DISSOLVED SOLIDS	420	10		V	UHSU
3687	GW02852IT	05/15/92	TOTAL DISSOLVED SOLIDS	430	10		V	UHSU
3687	GW03384IT	08/17/92	TOTAL DISSOLVED SOLIDS	430	14		V	UHSU
3687	GW03924IT	10/27/92	TOTAL DISSOLVED SOLIDS	430	14		V	UHSU
3786	GW01223IT	04/30/91	TOTAL DISSOLVED SOLIDS	1900	10		V	UHSU
3786	GW01521IT	07/17/91	TOTAL DISSOLVED SOLIDS	2100	10		V	UHSU
3786	GW01899IT	10/15/91	TOTAL DISSOLVED SOLIDS	1900	10		V	UHSU
3786	GW02656IT	04/14/92	TOTAL DISSOLVED SOLIDS	2300	10		V	UHSU
3786	GW03233IT	09/18/92	TOTAL DISSOLVED SOLIDS	2450	10		V	UHSU
3786	GW03641IT	10/13/92	TOTAL DISSOLVED SOLIDS	2500	14		V	UHSU
3986	GW01285IT	05/14/91	TOTAL DISSOLVED SOLIDS	410	10		V	UHSU
3986	GW01592IT	08/16/91	TOTAL DISSOLVED SOLIDS	410	10		V	UHSU
3986	GW02049IT	12/05/91	TOTAL DISSOLVED SOLIDS	400	10		V	UHSU
3986	GW02241IT	01/21/92	TOTAL DISSOLVED SOLIDS	370	10		V	UHSU
3986	GW02668IT	04/16/92	TOTAL DISSOLVED SOLIDS	390	10		V	UHSU
3986	GW03328IT	09/08/92	TOTAL DISSOLVED SOLIDS	410	14		V	UHSU
3986	GW03893IT	10/19/92	TOTAL DISSOLVED SOLIDS	390	14		V	UHSU
41591	GW02091IT	12/06/91	TOTAL DISSOLVED SOLIDS	780	10		V	UHSU
41591	GW02614IT	03/18/92	TOTAL DISSOLVED SOLIDS	650	10		V	UHSU
41591	GW02952IT	06/10/92	TOTAL DISSOLVED SOLIDS	890	5			UHSU
41591	GW03395IT	09/15/92	TOTAL DISSOLVED SOLIDS	858	10		V	UHSU
41591	GW03811IT	11/17/92	TOTAL DISSOLVED SOLIDS	890	14		V	UHSU
41691	GW02090IT	12/07/91	TOTAL DISSOLVED SOLIDS	430	10		V	UHSU
41691	GW02615IT	04/01/92	TOTAL DISSOLVED SOLIDS	680	10		V	UHSU
41691	GW02953IT	06/11/92	TOTAL DISSOLVED SOLIDS	560	5			UHSU
41691	GW03396IT	09/16/92	TOTAL DISSOLVED SOLIDS	528	10		V	UHSU
41691	GW03806IT	11/18/92	TOTAL DISSOLVED SOLIDS	410	10		V	UHSU
4186	GW02938IT	05/19/92	TOTAL DISSOLVED SOLIDS	450	10		V	UHSU
4186	GW03449IT	09/09/92	TOTAL DISSOLVED SOLIDS	490	14		V	UHSU
4286	GW01295IT	05/17/91	TOTAL DISSOLVED SOLIDS	610	10		V	UHSU
4286	GW01706IT	09/11/91	TOTAL DISSOLVED SOLIDS	568	10			UHSU
4286	GW02044IT	12/04/91	TOTAL DISSOLVED SOLIDS	560	10		V	UHSU
4286	GW02398IT	02/10/92	TOTAL DISSOLVED SOLIDS	570	10		V	UHSU
4286	GW02846IT	05/29/92	TOTAL DISSOLVED SOLIDS	480	10		V	UHSU
4286	GW03385IT	08/17/92	TOTAL DISSOLVED SOLIDS	490	14		V	UHSU
4286	GW03925IT	11/30/92	TOTAL DISSOLVED SOLIDS	530	14		V	UHSU
4386	GW01670IT	08/20/91	TOTAL DISSOLVED SOLIDS	400	10		V	UHSU
4386	GW02860IT	05/12/92	TOTAL DISSOLVED SOLIDS	380	10		V	UHSU
6286	GW01284IT	05/14/91	TOTAL DISSOLVED SOLIDS	320	10		V	UHSU
6286	GW01708IT	08/22/91	TOTAL DISSOLVED SOLIDS	350	10		V	UHSU
6286	GW02046IT	11/25/91	TOTAL DISSOLVED SOLIDS	320	10		V	UHSU
6286	GW02378IT	02/11/92	TOTAL DISSOLVED SOLIDS	350	10		V	UHSU
6286	GW03056IT	06/11/92	TOTAL DISSOLVED SOLIDS	360	5			UHSU
6286	GW03294IT	07/31/92	TOTAL DISSOLVED SOLIDS	370	10			UHSU
6286	GW03885IT	11/09/92	TOTAL DISSOLVED SOLIDS	340	14		V	UHSU
6386	GW01709IT	08/22/91	TOTAL DISSOLVED SOLIDS	510	10		V	UHSU
6386	GW03057IT	06/11/92	TOTAL DISSOLVED SOLIDS	490	5			UHSU
6486	GW02048IT	12/07/91	TOTAL DISSOLVED SOLIDS	640	10		V	UHSU
6486	GW02839IT	04/30/92	TOTAL DISSOLVED SOLIDS	510	10		V	UHSU
6586	GW01275IT	05/09/91	TOTAL DISSOLVED SOLIDS	530	10		V	UHSU
6586	GW01671IT	08/16/91	TOTAL DISSOLVED SOLIDS	570	10		V	UHSU
6586	GW02050IT	12/06/91	TOTAL DISSOLVED SOLIDS	540	10		V	UHSU
6586	GW02326IT	01/23/92	TOTAL DISSOLVED SOLIDS	510	10		V	UHSU
6586	GW02840IT	04/30/92	TOTAL DISSOLVED SOLIDS	420	10		V	UHSU

TABLE D-6
TOTAL DISSOLVED SOLIDS IN UHSU GROUNDWATER

location	fieldid	date_sampled	chemical	result (mg/l)	detectionlimit	qual_lab	qual_wc	location_z
6586	GW03308IT	08/06/92	TOTAL DISSOLVED SOLIDS	520	14		V	UHSU
6586	GW03947IT	12/14/92	TOTAL DISSOLVED SOLIDS	520	14		V	UHSU
B218789	GW01292IT	05/21/91	TOTAL DISSOLVED SOLIDS	380	10		V	UHSU
B218789	GW01673IT	08/20/91	TOTAL DISSOLVED SOLIDS	390	10		V	UHSU
B218789	GW02034IT	11/19/91	TOTAL DISSOLVED SOLIDS	350	10		V	UHSU
B218789	GW02419IT	02/18/92	TOTAL DISSOLVED SOLIDS	330	10		V	UHSU
B218789	GW02866IT	05/08/92	TOTAL DISSOLVED SOLIDS	380	10		V	UHSU
B218789	GW03349IT	08/21/92	TOTAL DISSOLVED SOLIDS	366	10		V	UHSU
B218789	GW03913IT	10/27/92	TOTAL DISSOLVED SOLIDS	380	14		V	UHSU



EXPLANATION

NEW IHSS BOUNDARY

OLD IHSS BOUNDARY

IHSS AREA BOUNDARY

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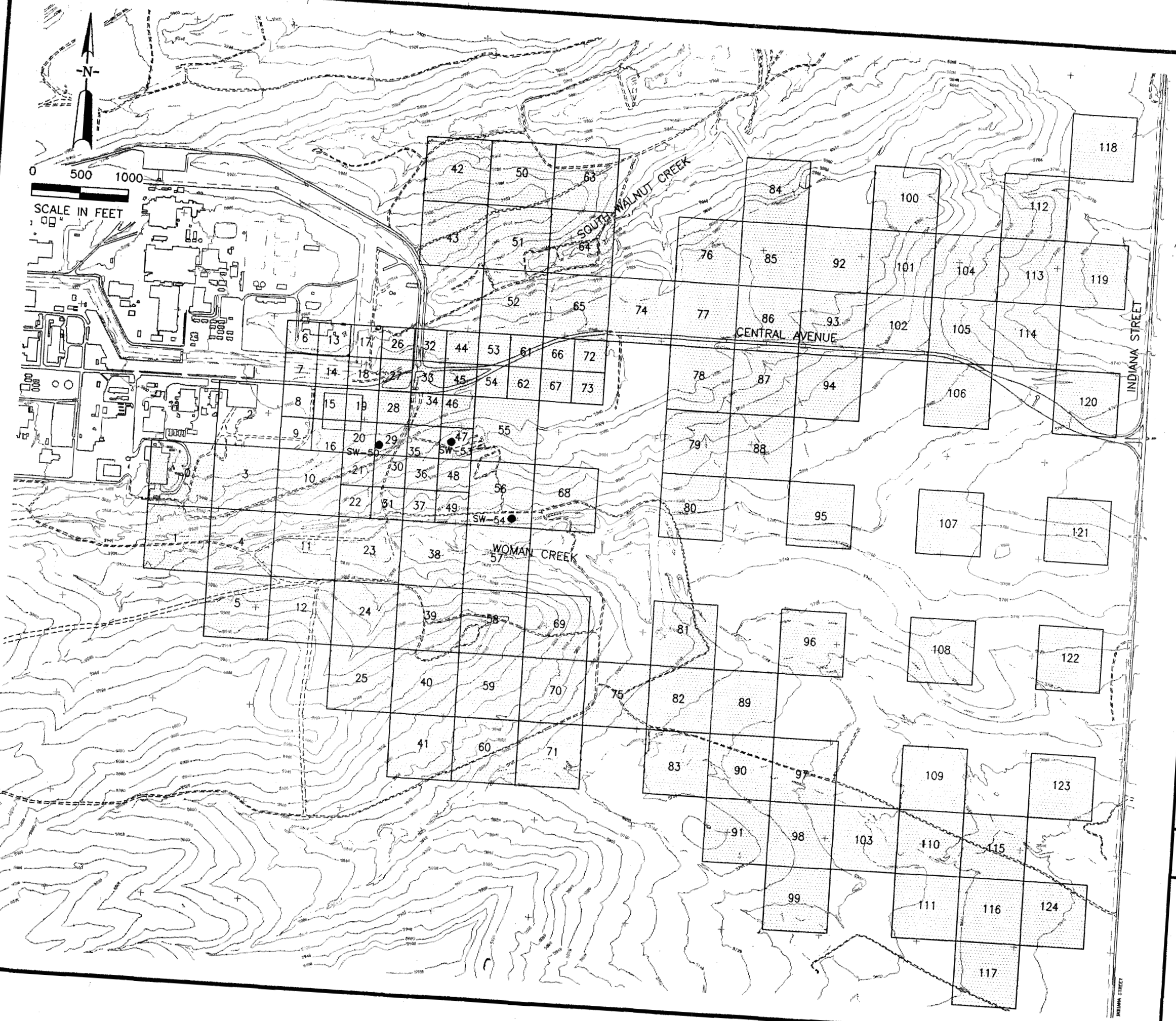
Rocky Flats Plant, Golden, Colorado

OPERABLE UNIT NO. 2
TECHNICAL MEMORANDUM NO. 9

LOCATION AND IDENTIFICATION OF IHSS's

FIGURE 1-1 JULY 1994

OU2TM901 1=300



EXPLANATION

- 1 — 10-ACRE SAMPLING PLOT LOCATION
- 6 — 2.5-ACRE SAMPLING PLOT LOCATION
- 2 — 10-ACRE PLOT NOT SAMPLED
- 7 — 2.5-ACRE PLOT NOT SAMPLED
- SW-50 — SURFACE WATER SAMPLING LOCATION

DRAFT

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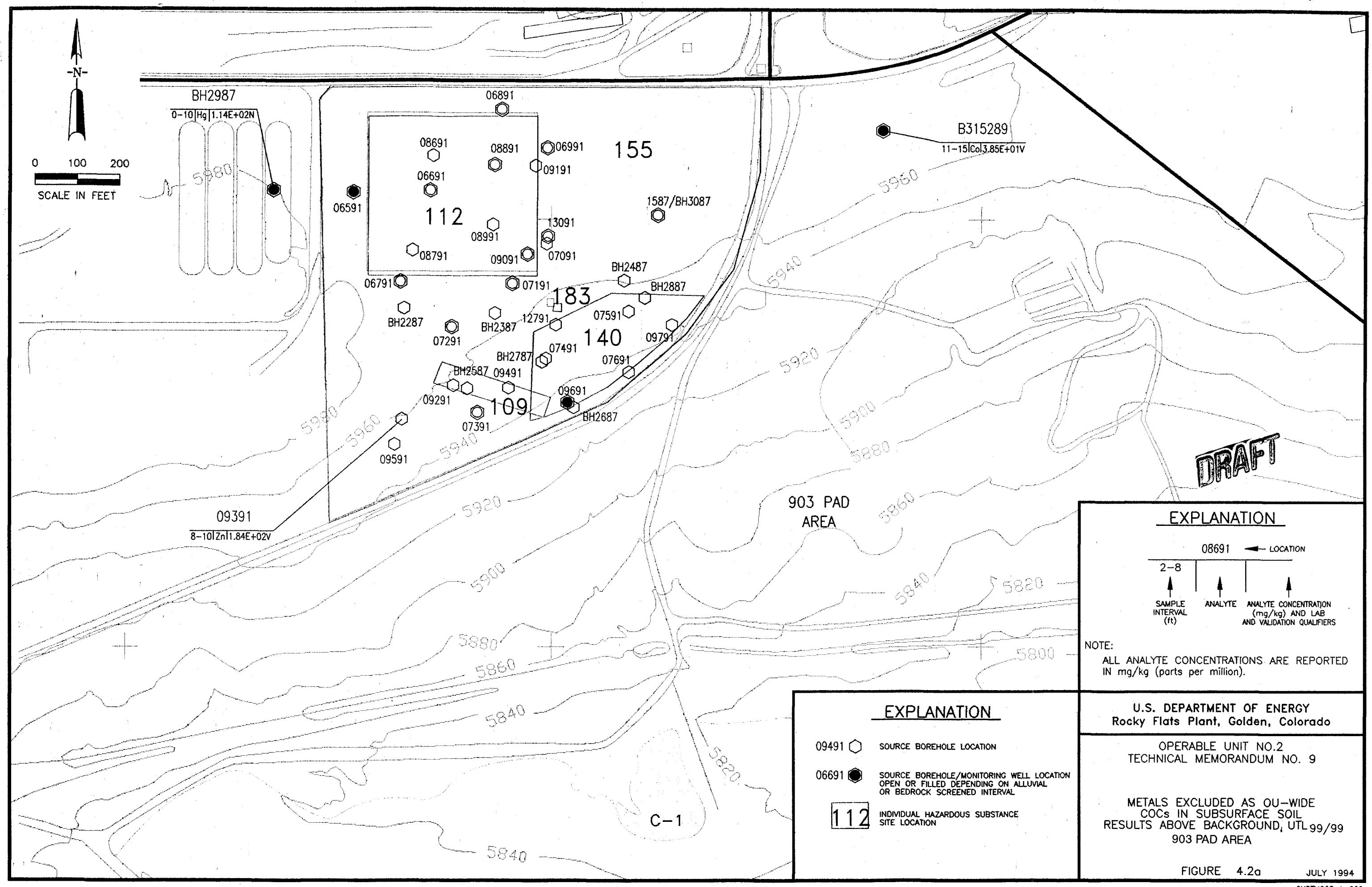
Rocky Flats Plant, Golden, Colorado

OPERABLE UNIT NO.2
TECHNICAL MEMORANDUM NO. 9

1991 RADIONUCLIDE SURFACE
SOIL SAMPLING PLOT LOCATIONS

FIGURE 3-1 JULY 1994

0U2TM942 1=1000


-N-
0 100 200
SCALE IN FEET
BH2987
0-10|Hg|1.14E+02N
5880
06891
08691
08891
06991
155
09191
06691
06591
112
13091
1587/BH3087
08991
08791
09091
07091
BH2487
06791
07191
183
BH2887
BH2287
BH2387
12791
07591
07291
140
09791
07491
BH2787
07691
BH2587
09491
09691
09291
109
BH2687
07391
09591
09391
8-10|Zn|1.84E+02V
B315289
11-15|Co|3.85E+01V
5960
5940
5920
5900
5880
5860
5840
5820
5800
903 PAD
AREA
C-1
DRAFT
EXPLANATION
08691 ← LOCATION
2-8
SAMPLE INTERVAL (ft)
ANALYTE
ANALYTE CONCENTRATION (mg/kg) AND LAB AND VALIDATION QUALIFIERS
NOTE:
ALL ANALYTE CONCENTRATIONS ARE REPORTED IN mg/kg (parts per million).
EXPLANATION
09491 SOURCE BOREHOLE LOCATION
06691 SOURCE BOREHOLE/MONITORING WELL LOCATION OPEN OR FILLED DEPENDING ON ALLUVIAL OR BEDROCK SCREENED INTERVAL
112 INDIVIDUAL HAZARDOUS SUBSTANCE SITE LOCATION
U.S. DEPARTMENT OF ENERGY
Rocky Flats Plant, Golden, Colorado
OPERABLE UNIT NO.2
TECHNICAL MEMORANDUM NO. 9
METALS EXCLUDED AS OU-WIDE COCs IN SUBSURFACE SOIL
RESULTS ABOVE BACKGROUND, UTL 99/99
903 PAD AREA
FIGURE 4.2a
JULY 1994
0U2TM928 1=200

-N-

0 100 200

SCALE IN FEET

B-1

B-2

B-3

B-4

5920 5900 5880 5860 5840 5820

10291

2-8	Ag	6.85E+01V
2-8	Cr	1.27E+02JA
2-8	Hg	6.00E+00JA
2-8	Zn	4.37E+02JA

216.2

DRAFT

CENTRAL AVE.

10191

4-8	Ag	9.65E+01

BH4087 BH4187 10391 BH4287 BH4587 BH4487 10491 BH4387 07891 BH4687 BH3987

110 111.1 111.7 111.8

B217589 T-13 B220489 B218589 B218789 B217389

EXPLANATION

10291 ← LOCATION

2-8

SAMPLE INTERVAL (ft)

ANALYTE

ANALYTE CONCENTRATION (mg/kg) AND LAB AND VALIDATION QUALIFIERS

NOTE:

ALL ANALYTE CONCENTRATIONS ARE REPORTED IN mg/kg (parts per million).

EXPLANATION

09491 ⬡ SOURCE BOREHOLE LOCATION

06691 ⬢ SOURCE BOREHOLE/MONITORING WELL LOCATION OPEN OR FILLED DEPENDING ON ALLUVIAL OR BEDROCK SCREENED INTERVAL

110 INDIVIDUAL HAZARDOUS SUBSTANCE SITE LOCATION

U.S. DEPARTMENT OF ENERGY
Rocky Flats Plant, Golden, Colorado

OPERABLE UNIT NO.2
TECHNICAL MEMORANDUM NO. 9

METALS EXCLUDED AS OU-WIDE COCs IN SUBSURFACE SOIL
RESULTS ABOVE BACKGROUND UTL 99/99
NE TRENCHES

FIGURE 4.2b JULY 1994

0U2TM929 1=200

-N-

0 100 200

SCALE IN FEET

CENTRAL AVE.

5940 5920 5900 5880 5860 5840

BH5687 BH5587 BH5387 BH4787 BH5087 BH5487 BH5287 BH5187

111.2 111.3 111.4 111.6 111.5

08091 12891 08191 10591 08391 08291 07991 08491 08591

BH4987 BH4887 B218689 B215389 B218989 B319789

T-12

46792

10-15|Mn|3.16E+03N*JA

B318889

10691 10891 10791 10991 B218189

216.3

DRAFT

EXPLANATION

09491 ⬡ SOURCE BOREHOLE LOCATION

01191A ⬡ ABANDONED M.W. LOCATION

00291 ● BEDROCK MONITORING WELL LOCATION

00891 ○ ALLUVIAL MONITORING WELL LOCATION

06691 ⬢ SOURCE BOREHOLE/MONITORING WELL LOCATION OPEN OR FILLED DEPENDING ON ALLUVIAL OR BEDROCK SCREENED INTERVAL

111.4 INDIVIDUAL HAZARDOUS SUBSTANCE SITE LOCATION

EXPLANATION

08191 ← LOCATION

2-8

- 2-8: SAMPLE INTERVAL (ft)
- ANALYTE
- ANALYTE CONCENTRATION (mg/kg) AND LAB AND VALIDATION QUALIFIERS

NOTE:

ALL ANALYTE CONCENTRATIONS ARE REPORTED IN mg/kg (parts per million).

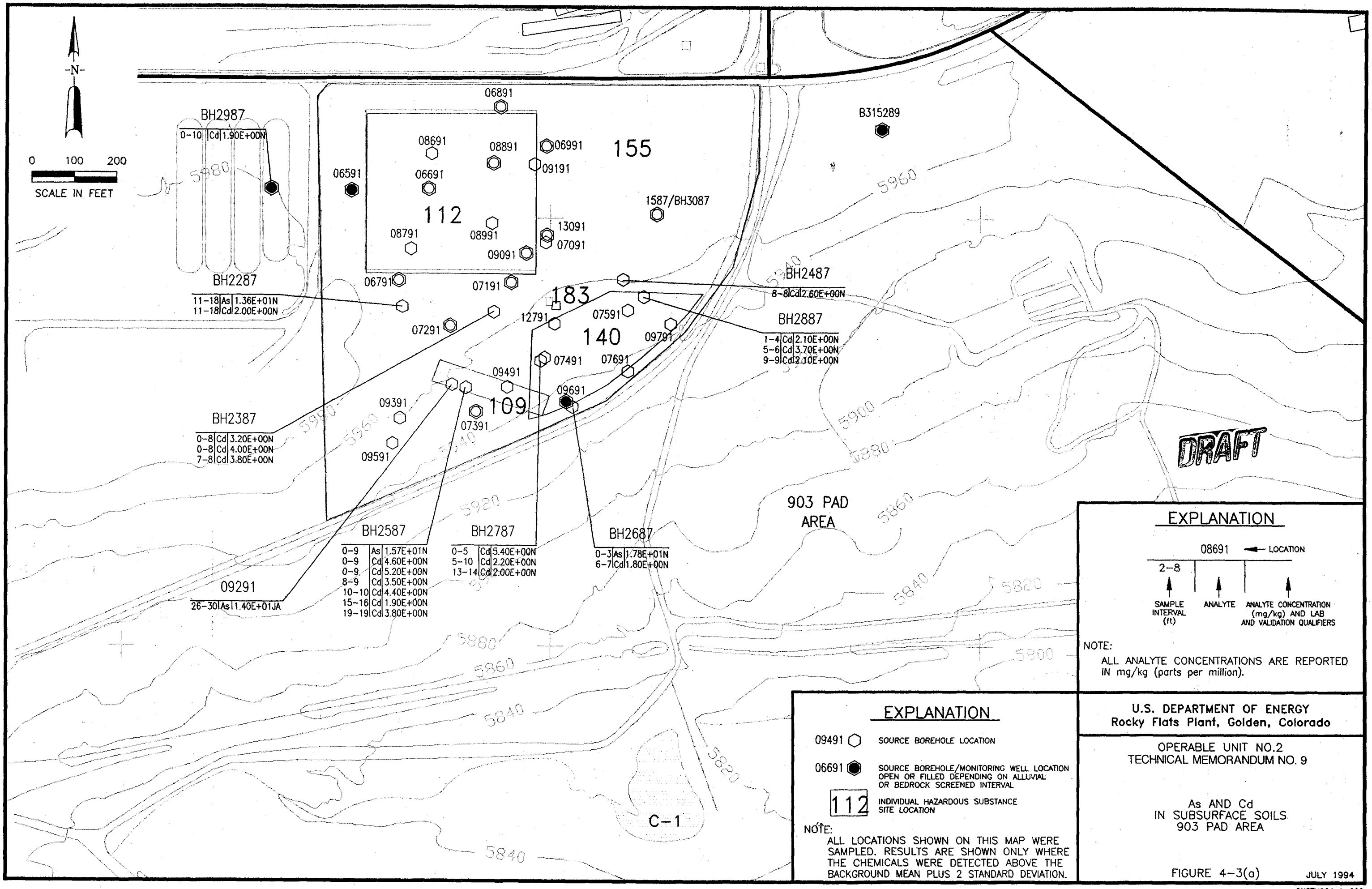
U.S. DEPARTMENT OF ENERGY
Rocky Flats Plant, Golden, Colorado

OPERABLE UNIT NO.2
TECHNICAL MEMORANDUM NO. 9

METALS EXCLUDED AS OU-WIDE COCs IN SUBSURFACE SOIL
RESULTS ABOVE BACKGROUND UTL 99/99
SE TRENCHES

FIGURE 4.2c JULY 1994

OU2RI555 1=200



EXPLANATION

08691 ← LOCATION

2-8

- SAMPLE INTERVAL (ft)
- ANALYTE
- ANALYTE CONCENTRATION (mg/kg) AND LAB AND VALIDATION QUALIFIERS

NOTE:
ALL ANALYTE CONCENTRATIONS ARE REPORTED IN mg/kg (parts per million).

EXPLANATION

09491 ⬡ SOURCE BOREHOLE LOCATION

06691 ⬢ SOURCE BOREHOLE/MONITORING WELL LOCATION OPEN OR FILLED DEPENDING ON ALLUVIAL OR BEDROCK SCREENED INTERVAL

112 INDIVIDUAL HAZARDOUS SUBSTANCE SITE LOCATION

NOTE:
ALL LOCATIONS SHOWN ON THIS MAP WERE SAMPLED. RESULTS ARE SHOWN ONLY WHERE THE CHEMICALS WERE DETECTED ABOVE THE BACKGROUND MEAN PLUS 2 STANDARD DEVIATION.

U.S. DEPARTMENT OF ENERGY
Rocky Flats Plant, Golden, Colorado

OPERABLE UNIT NO.2
TECHNICAL MEMORANDUM NO. 9

As AND Cd
IN SUBSURFACE SOILS
903 PAD AREA

FIGURE 4-3(a) JULY 1994

OU2TM924 1=200

-N-

0 100 200

SCALE IN FEET

BH3687

0-5	Cd	2.30E+00N
5-15	Cd	2.40E+00N
18-20	Cd	2.00E+00N
23-25	Cd	2.20E+00N

BH3787

11-12	Cd	3.20E+00N
18-22	Cd	2.90E+00N
25-26	As	2.00E+01N
25-26	Cd	3.30E+00N

09991

14-20	As	1.35E+01JA

BH3887

0-10	Cd	2.20E+00N
20-21	Cd	1.80E+00N

BH3587

12-15	Cd	2.20E+00N
14-15	Cd	2.60E+00N
18-19	As	1.40E+01N
18-19	Cd	3.30E+00N

BH3487

7-8	Cd	2.00E+00N
8-15	Cd	3.10E+00N
8-15	Cd	3.10E+00N
17-18	Cd	2.10E+00N

BH3387

0-4	Cd	3.70E+00N
8-15	As	1.50E+01N
20-21	As	1.50E+01N
20-21	Cd	3.20E+00N

BH3187

12-13	As	1.40E+01N

MOUND AREA

B-1

B-2

5920

5940

5960

5980

21793

09891

BH3287 154

153

113

108

DRAFT

NOTE:
ALL LOCATIONS SHOWN ON THIS MAP WERE SAMPLED. RESULTS ARE SHOWN ONLY WHERE THE CHEMICALS WERE DETECTED ABOVE THE BACKGROUND MEAN PLUS 2 STANDARD DEVIATION.

EXPLANATION

09491 ⬡	SOURCE BOREHOLE LOCATION
01191A ⬡	ABANDONED M.W. LOCATION
00291 ●	BEDROCK MONITORING WELL LOCATION
00891 ○	ALLUVIAL MONITORING WELL LOCATION
06691 ⬢	SOURCE BOREHOLE/MONITORING WELL LOCATION OPEN OR FILLED DEPENDING ON ALLUVIAL OR BEDROCK SCREENED INTERVAL
113	INDIVIDUAL HAZARDOUS SUBSTANCE SITE LOCATION

EXPLANATION

09991 ← LOCATION

2-8

- 2-8 ↑ SAMPLE INTERVAL (ft)
- ANALYTE
- ANALYTE CONCENTRATION (mg/Kg) AND LAB AND VALIDATION QUALIFIERS

NOTE:
ALL ANALYTE CONCENTRATIONS ARE REPORTED IN mg/kg (parts per million). ANALYTE ABBREVIATIONS AND LAB AND VALIDATION QUALIFIERS ARE PRESENTED ON FIGURE 4.2-1.

U.S. DEPARTMENT OF ENERGY
Rocky Flats Plant, Golden, Colorado

OPERABLE UNIT NO.2
TECHNICAL MEMORANDUM NO. 9

As AND Cd
IN SUBSURFACE SOILS
MOUND AREA

FIGURE 4-3(b) JULY 1994

0U2TM925 1=200

-N-

0 100 200

SCALE IN FEET

B-1

B-2

B-3

B-4

5920 5900 5880 5860 5840 5820

BH4387

4-5	Cd	2.20E+00N
10-10	Cd	2.50E+00N
12-13	Cd	1.70E+00N
15-16	Cd	3.20E+00N
17-18	Cd	2.10E+00N
22-23	Cd	2.80E+00N
25-26	Cd	2.40E+00N
27-30	Cd	3.20E+00N
30-32	Cd	2.80E+00N
30-32	Cd	3.60E+00N

BH4087

4-7	As	1.50E+01N
4-7	Cd	2.20E+00N

10291

2-8	Cd	1.05E+01JA

BH4187

0-12	As	1.40E+01N
15-17	Cd	2.30E+00N

BH4287

0-8	As	1.40E+01N
0-8	As	1.50E+01N
0-8	Cd	2.20E+00N
0-8	Cd	2.50E+00N
17-19	As	1.80E+01N
17-19	Cd	2.20E+00N
22-25	Cd	2.20E+00N
27-30	Cd	2.80E+00N
30-32	Cd	2.50E+00N

216.2

DRAFT

CENTRAL AVE.

B218589

10391

10191

110

111.1

B217589

111.7

BH3987

2-3	As	2.60E+01N
2-3	Cd	6.20E+00N
12-14	As	1.70E+01N
12-14	Cd	2.10E+00N
15-17	As	2.50E+01N
15-17	Cd	4.30E+00N
17-20	Cd	2.10E+00N
20-22	Cd	4.00E+00N

10491

111.8

07891

T-13

B220489

B217389

B217389

BH4587

0-10	Cd	3.40E+00N
10-17	Cd	2.90E+00N
18-20	As	1.40E+01N
18-20	Cd	4.10E+00N
20-22	Cd	2.60E+00N
23-25	Cd	3.00E+00N
28-30	Cd	6.10E+00N
30-33	As	1.40E+01N
30-33	Cd	4.50E+00N

BH4687

0-9	Cd	2.30E+00N
10-18	Cd	2.30E+00N
27-30	Cd	6.20E+00N
30-32	Cd	2.20E+00N

BH4487

4-6	Cd	2.10E+00N
20-22	Cd	3.00E+00N
22-24	Cd	2.90E+00N
25-27	Cd	2.60E+00N
32-35	Cd	2.10E+00N

EXPLANATION

10291 ← LOCATION

2-8

- 2-8: SAMPLE INTERVAL (ft)
- 10291: ANALYTE
- Cd 1.05E+01JA: ANALYTE CONCENTRATION (mg/kg) AND LAB AND VALIDATION QUALIFIERS

NOTE:
ALL ANALYTE CONCENTRATIONS ARE REPORTED IN mg/kg (parts per million).

EXPLANATION

09491 ⬡ SOURCE BOREHOLE LOCATION

06691 ⬢ SOURCE BOREHOLE/MONITORING WELL LOCATION OPEN OR FILLED DEPENDING ON ALLUVIAL OR BEDROCK SCREENED INTERVAL

110 INDIVIDUAL HAZARDOUS SUBSTANCE SITE LOCATION

NOTE:
ALL LOCATIONS SHOWN ON THIS MAP WERE SAMPLED. RESULTS ARE SHOWN ONLY WHERE THE CHEMICALS WERE DETECTED ABOVE THE BACKGROUND MEAN PLUS 2 STANDARD DEVIATION.

U.S. DEPARTMENT OF ENERGY
Rocky Flats Plant, Golden, Colorado

OPERABLE UNIT NO.2
TECHNICAL MEMORANDUM NO. 9

As AND Cd
IN SUBSURFACE SOILS
N.E. TRENCHES AREA

FIGURE 4-3(c) JULY 1994

0U2TM926 1=200

-N-

0 100 200

SCALE IN FEET

CENTRAL AVE.

BH5087

12-13	Cd	2.70E+00N
17-20	As	1.62E+01N

BH5687

2-4	Cd	1.70E+00N
12-14	Cd	1.80E+00N

BH5387

0-19	Cd	2.30E+00N
2-4	As	1.46E+01N
2-4	Cd	2.00E+00N
16-18	Cd	2.30E+00N

BH4787

6-7	Cd	1.90E+00N
8-9	Cd	2.60E+00N

BH5587

12-14	Cd	1.70E+00N
15-24	Cd	3.80E+00N
2-3	Cd	2.40E+00N

BH5487

6-8	As	2.96E+01N
6-8	Cd	2.10E+00N
10-12	Cd	1.80E+00N
12-14	As	1.46E+01N
12-14	Cd	2.00E+00N
14-23	As	3.08E+01N
14-23	Cd	5.50E+00N
24-33	Cd	1.90E+00N

BH4887

6-7	As	2.28E+01N
6-7	Cd	2.40E+00N
15-17	Cd	1.90E+00N

BH5187

0-9	As	2.84E+01N
0-9	Cd	5.60E+00N

08591

38-44	As	1.84E+01V

BH4987

6-7	As	1.37E+01N
6-7	Cd	2.40E+00N
8-16	Cd	3.60E+00N
24-26	As	1.85E+01N

46792

10-15	As	1.49E+01V

T-12

B215389 B218689 B218989 B319789 B318889 B218189

08091 12891 08191 10591 08391 08291 08491 BH5287

10691 10891 10791 10991

111.2 111.3 111.4 111.6 111.5 216.3

5940 5920 5900 5880 5860 5840

DRAFT

NOTE:
ALL LOCATIONS SHOWN ON THIS MAP WERE SAMPLED. RESULTS ARE SHOWN ONLY WHERE THE CHEMICALS WERE DETECTED ABOVE THE BACKGROUND MEAN PLUS 2 STANDARD DEVIATION.

EXPLANATION

09491 ⬡	SOURCE BOREHOLE LOCATION
01191A ⬡	ABANDONED M.W. LOCATION
00291 ●	BEDROCK MONITORING WELL LOCATION
00891 ○	ALLUVIAL MONITORING WELL LOCATION
06691 ⬢	SOURCE BOREHOLE/MONITORING WELL LOCATION OPEN OR FILLED DEPENDING ON ALLUVIAL OR BEDROCK SCREENED INTERVAL
111.4	INDIVIDUAL HAZARDOUS SUBSTANCE SITE LOCATION

EXPLANATION

08191 ← LOCATION

2-8

SAMPLE INTERVAL (ft) | ANALYTE | ANALYTE CONCENTRATION (mg/kg) AND LAB AND VALIDATION QUALIFIERS

NOTE:
ALL ANALYTE CONCENTRATIONS ARE REPORTED IN mg/kg (parts per million).

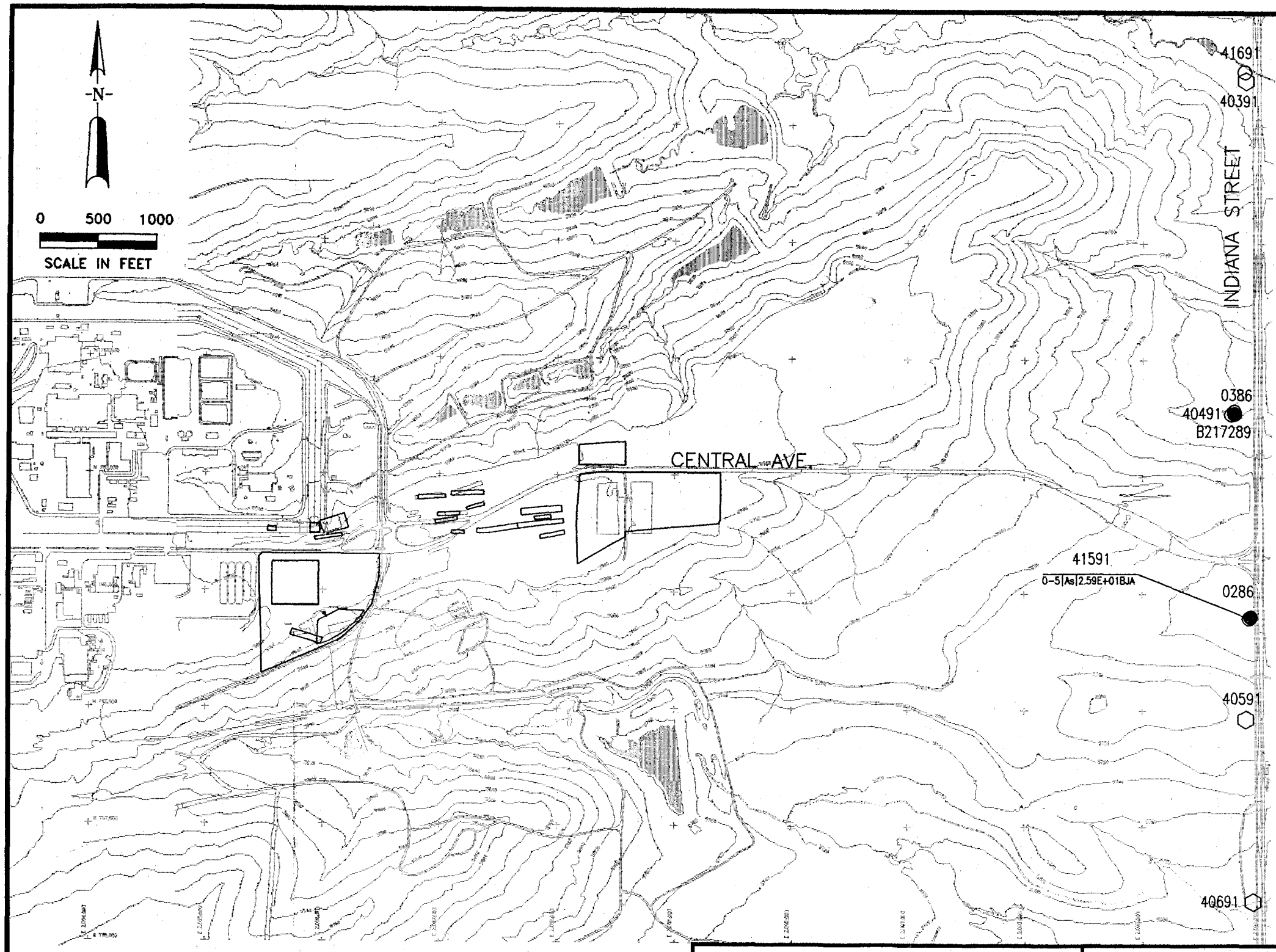
U.S. DEPARTMENT OF ENERGY
Rocky Flats Plant, Golden, Colorado

OPERABLE UNIT NO.2
TECHNICAL MEMORANDUM NO. 9

As AND Cd
IN SUBSURFACE SOILS
S.E. TRENCHES AREA

FIGURE 4-3(d) JULY 1994

0U2TM927 1=200



DRAFT

NOTE:
ALL LOCATIONS SHOWN ON THIS MAP WERE SAMPLED. RESULTS ARE SHOWN ONLY WHERE THE CHEMICALS WERE DETECTED ABOVE THE BACKGROUND MEAN PLUS 2 STANDARD DEVIATION.

EXPLANATION

08691 ← LOCATION

0-11

- 0-11: SAMPLE INTERVAL (ft)
- ANALYTE
- ANALYTE CONCENTRATION (mg/kg) AND LAB AND VALIDATION QUALIFIERS

NOTE:
ALL ANALYTE CONCENTRATIONS ARE REPORTED IN mg/kg (parts per million).

EXPLANATION

09491 ⬡	SOURCE BOREHOLE LOCATION
01191A ⬡	ABANDONED M.W. LOCATION
00291 ●	BEDROCK MONITORING WELL LOCATION
00891 ○	ALLUVIAL MONITORING WELL LOCATION
06691 ⬢	SOURCE BOREHOLE/MONITORING WELL LOCATION OPEN OR FILLED DEPENDING ON ALLUVIAL OR BEDROCK SCREENED INTERVAL
111.4	INDIVIDUAL HAZARDOUS SUBSTANCE SITE LOCATION

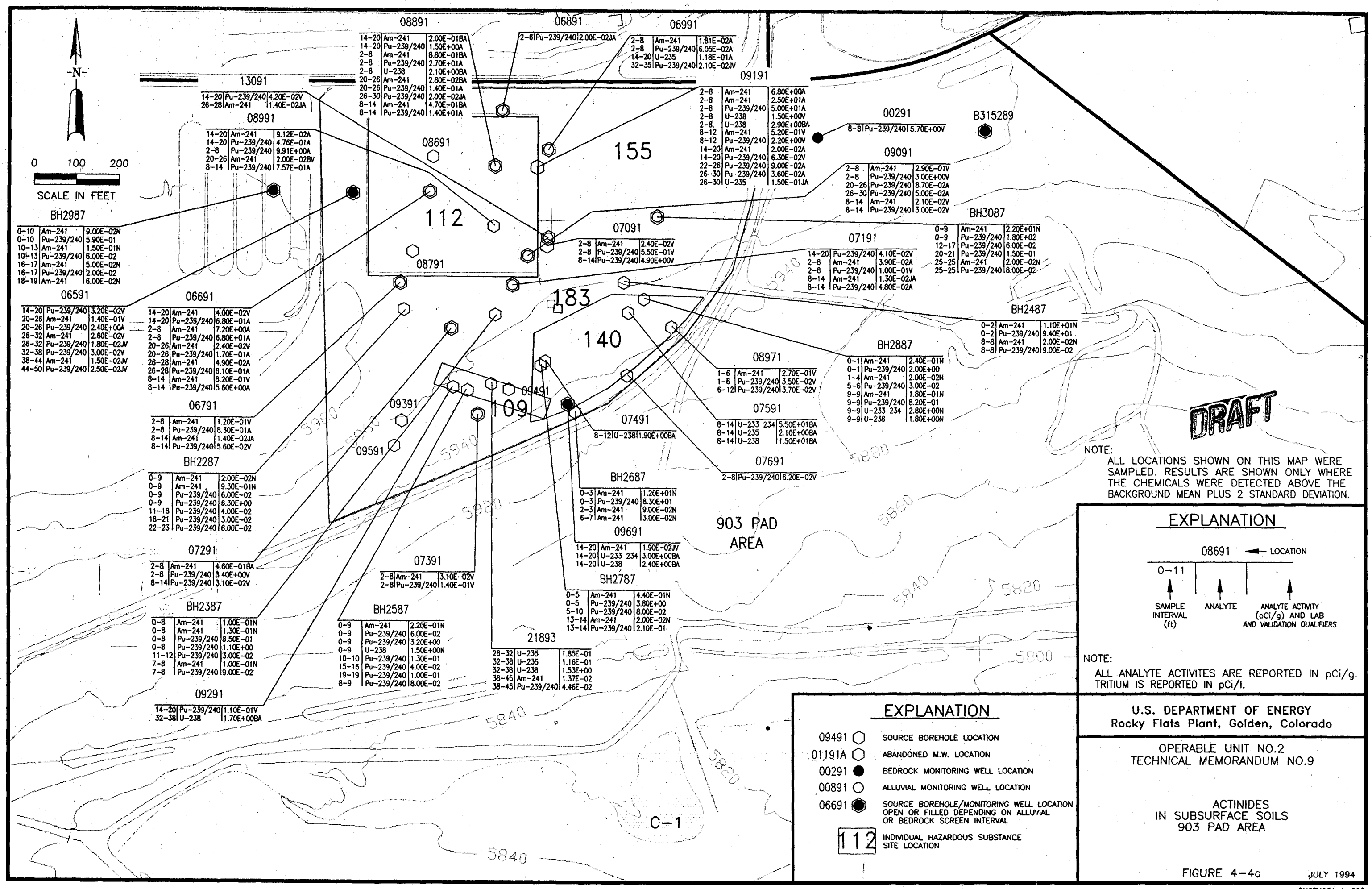
U.S. DEPARTMENT OF ENERGY
Rocky Flats Plant, Golden, Colorado

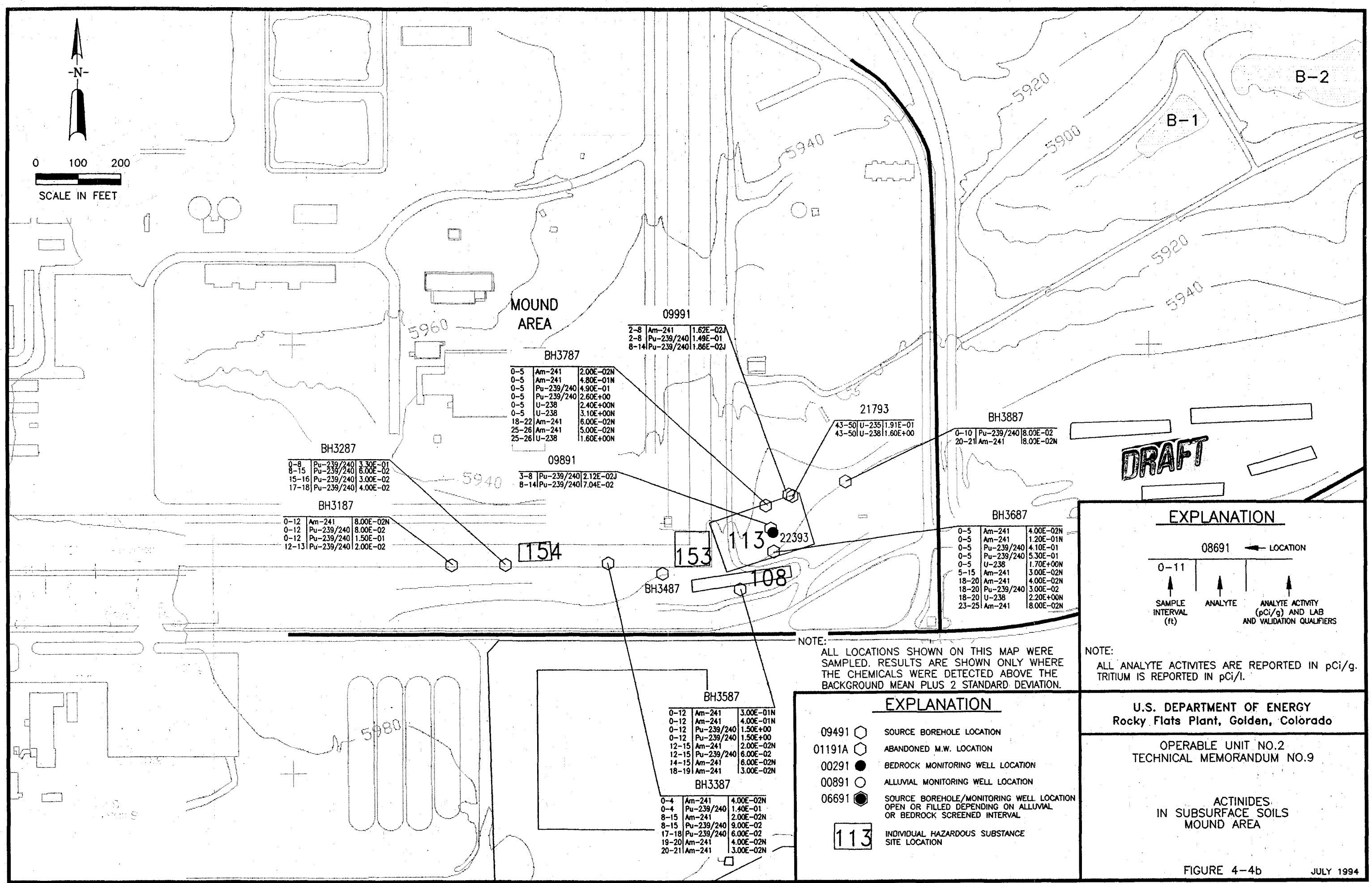
OPERABLE UNIT NO.2
TECHNICAL MEMORANDUM NO. 9

As AND Cd
IN SUBSURFACE SOILS
EAST OF IHSS AREAS

FIGURE 4-3(e) JULY 1994

OU2TM923 1=1000


-N-
0 100 200
SCALE IN FEET
08891
14-20 Am-241 2.00E-01BA
14-20 Pu-239/240 1.50E+00A
2-8 Am-241 8.80E-01BA
2-8 Pu-239/240 2.70E+01A
2-8 U-238 2.10E+00BA
20-26 Am-241 2.80E-02BA
20-26 Pu-239/240 1.40E-01A
26-30 Pu-239/240 2.00E-02JA
8-14 Am-241 4.70E-01BA
8-14 Pu-239/240 1.40E+01A
06891
2-6 Pu-239/240 2.00E-02JA
06991
2-8 Am-241 1.81E-02A
2-8 Pu-239/240 6.05E-02A
14-20 U-235 1.18E-01A
32-35 Pu-239/240 2.10E-02JV
13091
14-20 Pu-239/240 4.20E-02V
26-28 Am-241 1.40E-02JA
08991
14-20 Am-241 9.12E-02A
14-20 Pu-239/240 4.76E-01A
2-8 Pu-239/240 9.91E+00A
20-26 Am-241 2.00E-02BV
8-14 Pu-239/240 7.57E-01A
08691
155
112
08791
09191
2-8 Am-241 6.80E+00A
2-8 Am-241 2.50E+01A
2-8 Pu-239/240 5.00E+01A
2-8 U-238 1.50E+00V
2-8 U-238 2.90E+00BA
8-12 Am-241 5.20E-01V
8-12 Pu-239/240 2.20E+00V
14-20 Am-241 2.00E-02A
14-20 Pu-239/240 6.30E-02V
22-26 Pu-239/240 9.00E-02A
26-30 Pu-239/240 3.60E-02A
26-30 U-235 1.50E-01JA
00291
8-8 Pu-239/240 5.70E+00V
B315289
09091
2-8 Am-241 2.90E-01V
2-8 Pu-239/240 3.00E+00V
20-26 Pu-239/240 8.70E-02A
26-30 Pu-239/240 5.00E-02A
8-14 Am-241 2.10E-02V
8-14 Pu-239/240 3.00E-02V
BH3087
0-9 Am-241 2.20E+01N
0-9 Pu-239/240 1.80E+02
12-17 Pu-239/240 6.00E-02
20-21 Pu-239/240 1.50E-01
25-25 Am-241 2.00E-02N
25-25 Pu-239/240 8.00E-02
BH2987
0-10 Am-241 9.00E-02N
0-10 Pu-239/240 5.90E-01
10-13 Am-241 1.50E-01N
10-13 Pu-239/240 6.00E-02
16-17 Am-241 5.00E-02N
16-17 Pu-239/240 2.00E-02
18-19 Am-241 6.00E-02N
07091
2-8 Am-241 2.40E-02V
2-8 Pu-239/240 5.50E-01V
8-14 Pu-239/240 4.90E+00V
07191
14-20 Pu-239/240 4.10E-02V
2-8 Am-241 3.90E-02A
2-8 Pu-239/240 1.00E-01V
8-14 Am-241 1.30E-02JA
8-14 Pu-239/240 4.80E-02A
BH2487
0-2 Am-241 1.10E+01N
0-2 Pu-239/240 9.40E+01
8-8 Am-241 2.00E-02N
8-8 Pu-239/240 9.00E-02
06591
14-20 Pu-239/240 3.20E-02V
20-26 Am-241 1.40E-01V
20-26 Pu-239/240 2.40E+00A
26-32 Am-241 2.60E-02V
26-32 Pu-239/240 1.80E-02JV
32-38 Pu-239/240 3.00E-02V
38-44 Am-241 1.50E-02JV
44-50 Pu-239/240 2.50E-02JV
06691
14-20 Am-241 4.00E-02V
14-20 Pu-239/240 6.80E-01A
2-8 Am-241 7.20E+00A
2-8 Pu-239/240 6.80E+01A
20-26 Am-241 2.40E-02V
20-26 Pu-239/240 1.70E-01A
26-28 Am-241 4.90E-02A
26-28 Pu-239/240 6.10E-01A
8-14 Am-241 8.20E-01V
8-14 Pu-239/240 5.60E+00A
183
140
109
09491
09391
09591
07491
8-12 U-238 1.90E+00BA
08971
1-6 Am-241 2.70E-01V
1-6 Pu-239/240 3.50E-02V
6-12 Pu-239/240 3.70E-02V
07591
8-14 U-233 234 5.50E+01BA
8-14 U-235 2.10E+00BA
8-14 U-238 1.50E+01BA
07691
2-8 Pu-239/240 6.20E-02V
BH2887
0-1 Am-241 2.40E-01N
0-1 Pu-239/240 2.00E+00
1-4 Am-241 2.00E-02N
5-6 Pu-239/240 3.00E-02
9-9 Am-241 1.80E-01N
9-9 Pu-239/240 8.20E-01
9-9 U-233 234 2.80E+00N
9-9 U-238 1.80E+00N
06791
2-8 Am-241 1.20E-01V
2-8 Pu-239/240 8.30E-01A
8-14 Am-241 1.40E-02JA
8-14 Pu-239/240 5.60E-02V
BH2287
0-9 Am-241 2.00E-02N
0-9 Am-241 9.30E-01N
0-9 Pu-239/240 6.00E-02
0-9 Pu-239/240 6.30E+00
11-18 Pu-239/240 4.00E-02
18-21 Pu-239/240 3.00E-02
22-23 Pu-239/240 6.00E-02
BH2687
0-3 Am-241 1.20E+01N
0-3 Pu-239/240 8.30E+01
2-3 Am-241 9.00E-02N
6-7 Am-241 3.00E-02N
09691
14-20 Am-241 1.90E-02JV
14-20 U-233 234 3.00E+00BA
14-20 U-238 2.40E+00BA
BH2787
0-5 Am-241 4.40E-01N
0-5 Pu-239/240 3.80E+00
5-10 Pu-239/240 8.00E-02
13-14 Am-241 2.00E-02N
13-14 Pu-239/240 2.10E-01
07291
2-8 Am-241 4.60E-01BA
2-8 Pu-239/240 3.40E+00V
8-14 Pu-239/240 3.10E-02V
07391
2-8 Am-241 3.10E-02V
2-8 Pu-239/240 1.40E-01V
BH2387
0-8 Am-241 1.00E-01N
0-8 Am-241 1.30E-01N
0-8 Pu-239/240 8.50E-01
0-8 Pu-239/240 1.10E+00
11-12 Pu-239/240 3.00E-02
7-8 Am-241 1.00E-01N
7-8 Pu-239/240 9.00E-02
BH2587
0-9 Am-241 2.20E-01N
0-9 Pu-239/240 6.00E-02
0-9 Pu-239/240 3.20E+00
0-9 U-238 1.50E+00N
10-10 Pu-239/240 1.30E-01
15-16 Pu-239/240 4.00E-02
19-19 Pu-239/240 1.00E-01
8-9 Pu-239/240 8.00E-02
09291
14-20 Pu-239/240 1.10E-01V
32-38 U-238 1.70E+00BA
21893
26-32 U-235 1.85E-01
32-38 U-235 1.16E-01
32-38 U-238 1.53E+00
38-45 Am-241 1.37E-02
38-45 Pu-239/240 4.46E-02
903 PAD AREA
C-1
5940
5960
5920
5880
5860
5840
5820
5800
DRAFT
NOTE:
ALL LOCATIONS SHOWN ON THIS MAP WERE SAMPLED. RESULTS ARE SHOWN ONLY WHERE THE CHEMICALS WERE DETECTED ABOVE THE BACKGROUND MEAN PLUS 2 STANDARD DEVIATION.
EXPLANATION
08691 ← LOCATION
0-11
SAMPLE INTERVAL (ft)
ANALYTE
ANALYTE ACTIVITY (pCi/g) AND LAB AND VALIDATION QUALIFIERS
NOTE:
ALL ANALYTE ACTIVITES ARE REPORTED IN pCi/g. TRITIUM IS REPORTED IN pCi/l.
EXPLANATION
09491 SOURCE BOREHOLE LOCATION
01191A ABANDONED M.W. LOCATION
00291 BEDROCK MONITORING WELL LOCATION
00891 ALLUVIAL MONITORING WELL LOCATION
06691 SOURCE BOREHOLE/MONITORING WELL LOCATION OPEN OR FILLED DEPENDING ON ALLUVIAL OR BEDROCK SCREEN INTERVAL
112 INDIVIDUAL HAZARDOUS SUBSTANCE SITE LOCATION
U.S. DEPARTMENT OF ENERGY
Rocky Flats Plant, Golden, Colorado
OPERABLE UNIT NO.2
TECHNICAL MEMORANDUM NO.9
ACTINIDES
IN SUBSURFACE SOILS
903 PAD AREA
FIGURE 4-4a
JULY 1994
OU2TM931 1=200



NOTE:
ALL LOCATIONS SHOWN ON THIS MAP WERE SAMPLED. RESULTS ARE SHOWN ONLY WHERE THE CHEMICALS WERE DETECTED ABOVE THE BACKGROUND MEAN PLUS 2 STANDARD DEVIATION.

EXPLANATION

09491 ⬡ SOURCE BOREHOLE LOCATION
01191A ⬡ ABANDONED M.W. LOCATION
00291 ● BEDROCK MONITORING WELL LOCATION
00891 ○ ALLUVIAL MONITORING WELL LOCATION
06691 ⬢ SOURCE BOREHOLE/MONITORING WELL LOCATION OPEN OR FILLED DEPENDING ON ALLUVIAL OR BEDROCK SCREENED INTERVAL
113 INDIVIDUAL HAZARDOUS SUBSTANCE SITE LOCATION

EXPLANATION

08691 ← LOCATION

0-11
- SAMPLE INTERVAL (ft)
- ANALYTE
- ANALYTE ACTIVITY (pCi/g) AND LAB AND VALIDATION QUALIFIERS

NOTE:
ALL ANALYTE ACTIVITES ARE REPORTED IN pCi/g. TRITIUM IS REPORTED IN pCi/l.

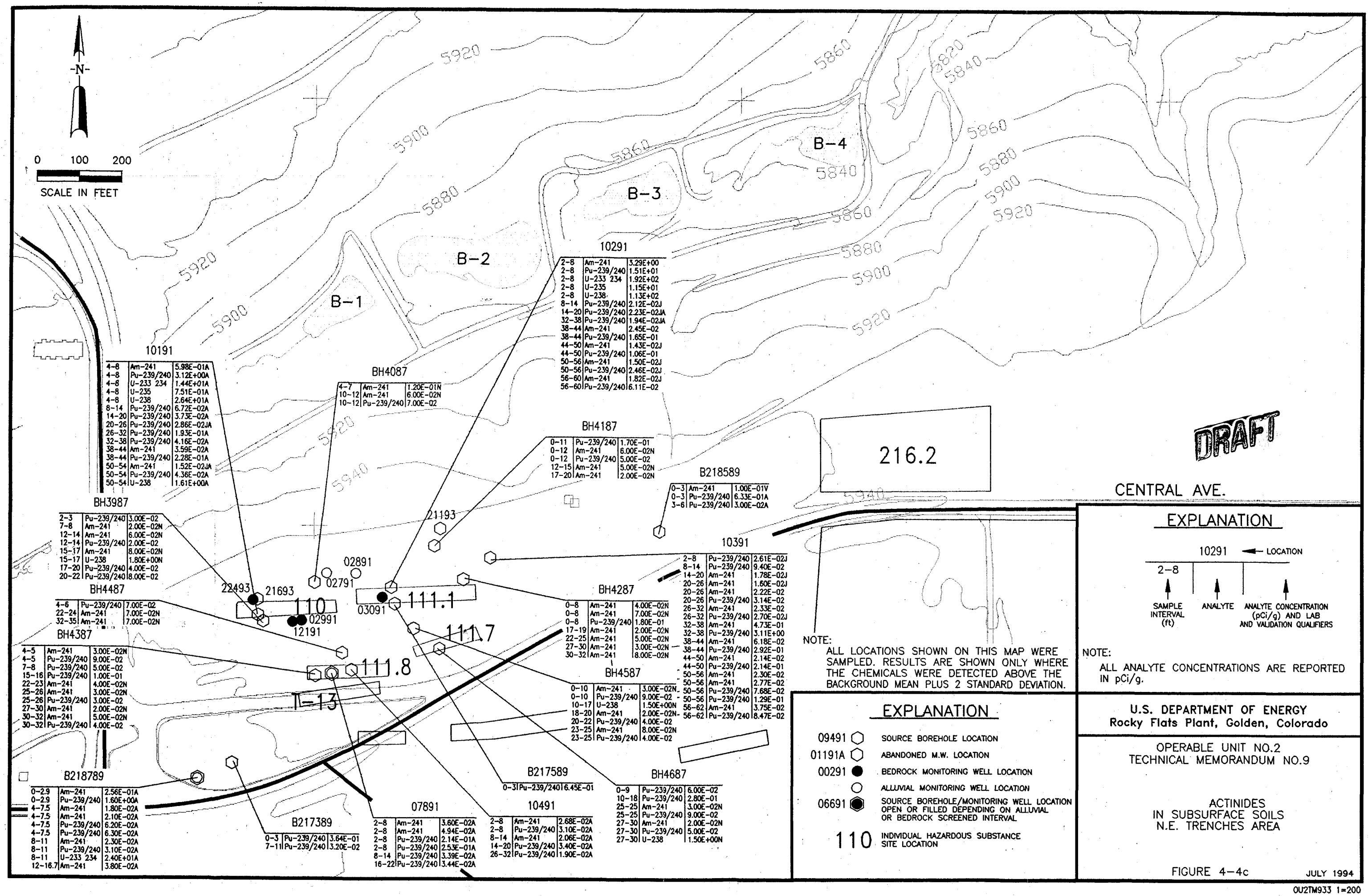
U.S. DEPARTMENT OF ENERGY
Rocky Flats Plant, Golden, Colorado

OPERABLE UNIT NO.2
TECHNICAL MEMORANDUM NO.9

ACTINIDES
IN SUBSURFACE SOILS
MOUND AREA

FIGURE 4-4b JULY 1994

0U2TM932 1=200



NOTE:
ALL LOCATIONS SHOWN ON THIS MAP WERE SAMPLED. RESULTS ARE SHOWN ONLY WHERE THE CHEMICALS WERE DETECTED ABOVE THE BACKGROUND MEAN PLUS 2 STANDARD DEVIATION.

EXPLANATION

09491 ⬡ SOURCE BOREHOLE LOCATION
01191A ⬡ ABANDONED M.W. LOCATION
00291 ● BEDROCK MONITORING WELL LOCATION
○ ALLUVIAL MONITORING WELL LOCATION
06691 ◉ SOURCE BOREHOLE/MONITORING WELL LOCATION OPEN OR FILLED DEPENDING ON ALLUVIAL OR BEDROCK SCREENED INTERVAL
110 INDIVIDUAL HAZARDOUS SUBSTANCE SITE LOCATION

EXPLANATION

10291 ← LOCATION
2-8 ↑ SAMPLE INTERVAL (ft)
↑ ANALYTE
↑ ANALYTE CONCENTRATION (pCi/g) AND LAB AND VALIDATION QUALIFIERS

NOTE:
ALL ANALYTE CONCENTRATIONS ARE REPORTED IN pCi/g.

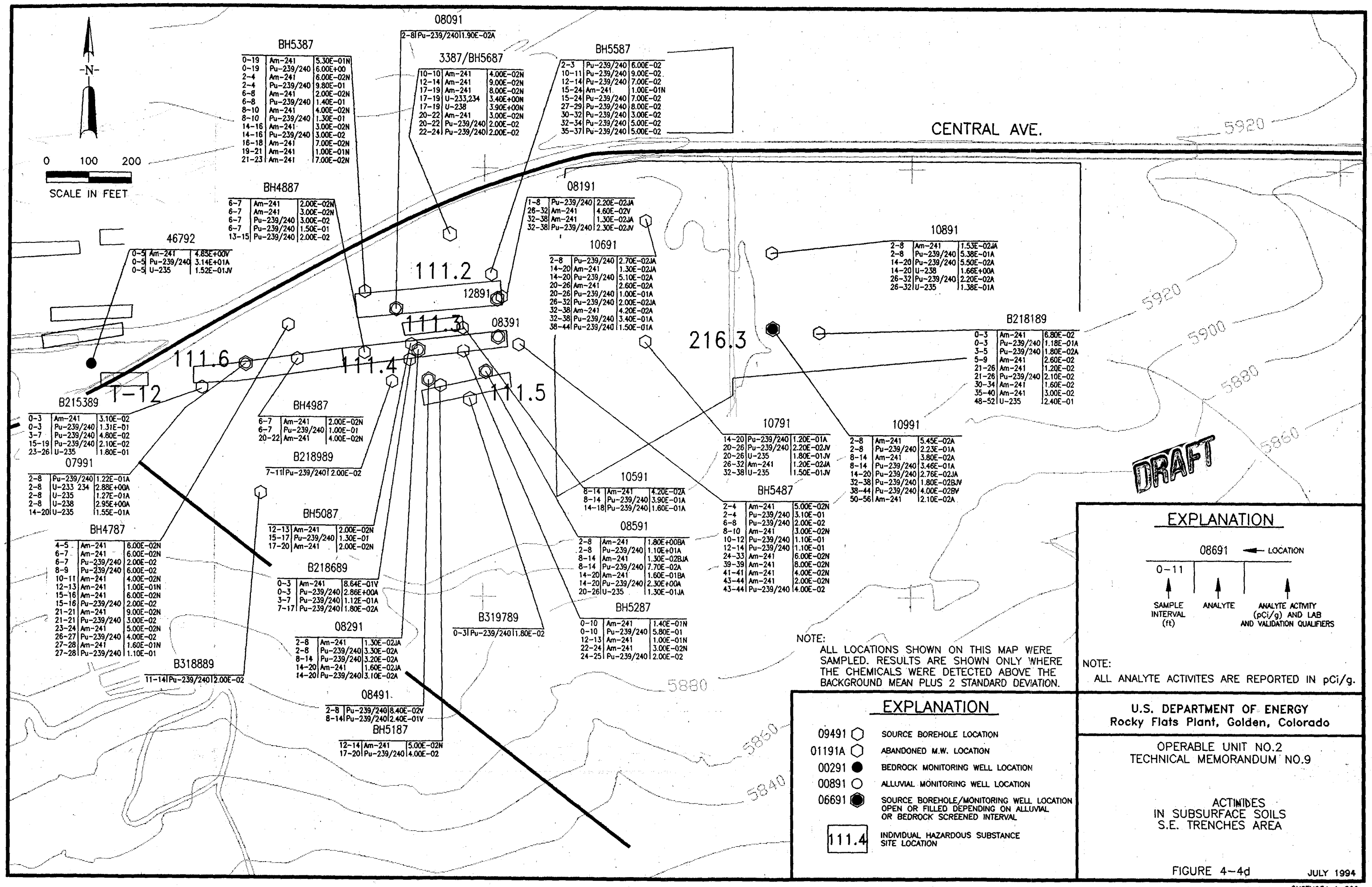
U.S. DEPARTMENT OF ENERGY
Rocky Flats Plant, Golden, Colorado

OPERABLE UNIT NO.2
TECHNICAL MEMORANDUM NO.9

ACTINIDES
IN SUBSURFACE SOILS
N.E. TRENCHES AREA

FIGURE 4-4c JULY 1994

0U2TM933 1=200



NOTE:
ALL LOCATIONS SHOWN ON THIS MAP WERE SAMPLED. RESULTS ARE SHOWN ONLY WHERE THE CHEMICALS WERE DETECTED ABOVE THE BACKGROUND MEAN PLUS 2 STANDARD DEVIATION.

EXPLANATION

08691 ← LOCATION

0-11

- SAMPLE INTERVAL (ft)
- ANALYTE
- ANALYTE ACTIVITY (pCi/g) AND LAB AND VALIDATION QUALIFIERS

NOTE:
ALL ANALYTE ACTIVITES ARE REPORTED IN pCi/g.

EXPLANATION

- 09491 ⬡ SOURCE BOREHOLE LOCATION
- 01191A ⬡ ABANDONED M.W. LOCATION
- 00291 ● BEDROCK MONITORING WELL LOCATION
- 00891 ○ ALLUVIAL MONITORING WELL LOCATION
- 06691 ⬢ SOURCE BOREHOLE/MONITORING WELL LOCATION OPEN OR FILLED DEPENDING ON ALLUVIAL OR BEDROCK SCREENED INTERVAL
- 111.4 INDIVIDUAL HAZARDOUS SUBSTANCE SITE LOCATION

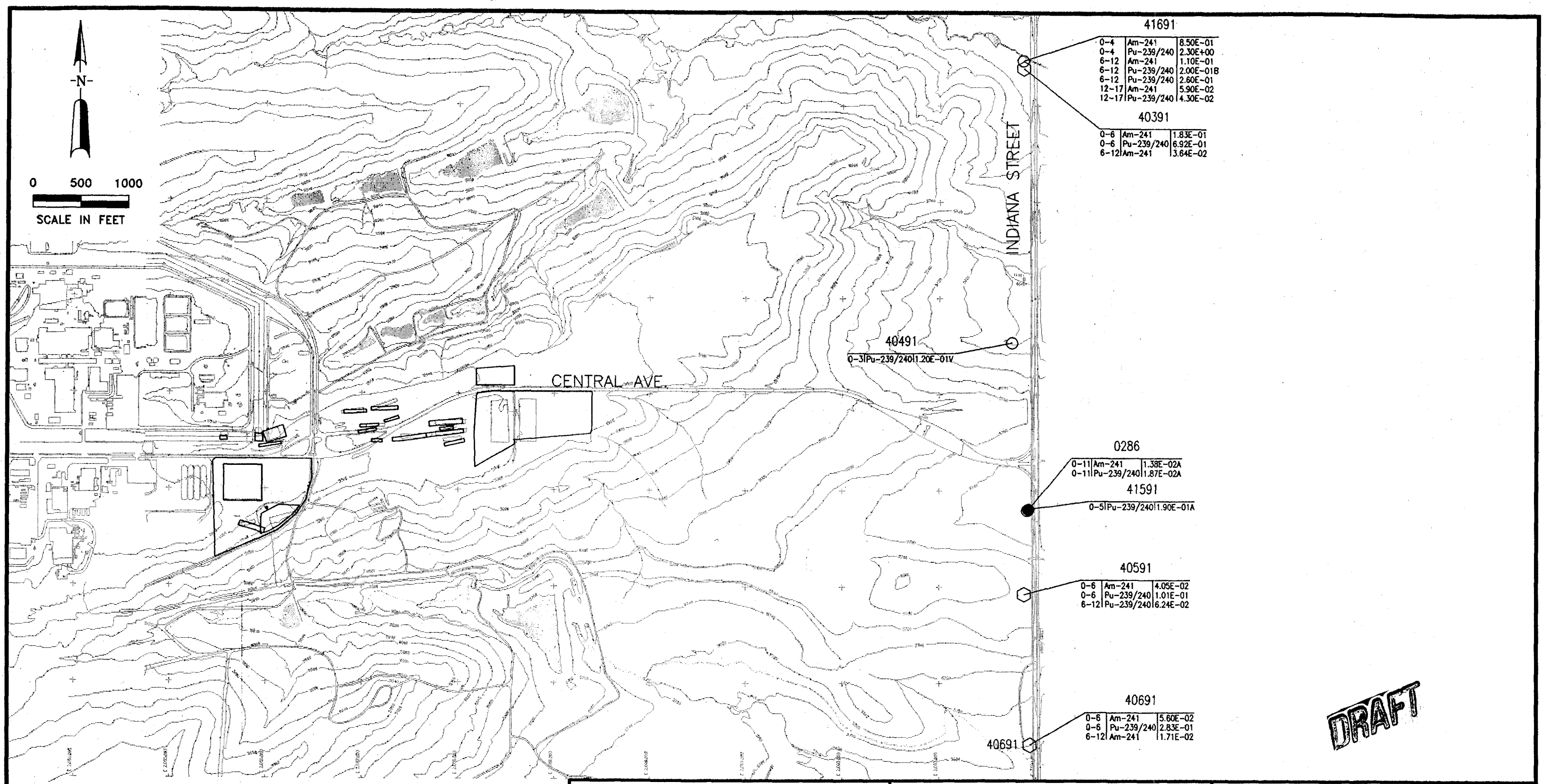
U.S. DEPARTMENT OF ENERGY
Rocky Flats Plant, Golden, Colorado

OPERABLE UNIT NO.2
TECHNICAL MEMORANDUM NO.9

ACTINIDES IN SUBSURFACE SOILS S.E. TRENCHES AREA

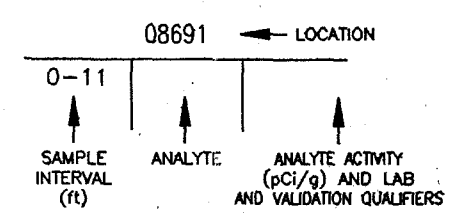
FIGURE 4-4d JULY 1994

OU2TM934 1=200



NOTE:
ALL LOCATIONS SHOWN ON THIS MAP WERE SAMPLED. RESULTS ARE SHOWN ONLY WHERE THE CHEMICALS WERE DETECTED ABOVE THE BACKGROUND MEAN PLUS 2 STANDARD DEVIATION.

EXPLANATION



NOTE:
ALL ANALYTE ACTIVITES ARE REPORTED IN pCi/g. TRITIUM IS REPORTED IN pCi/l.

EXPLANATION

09491 ⬡	SOURCE BOREHOLE LOCATION
01191A ⬡	ABANDONED M.W. LOCATION
00291 ●	BEDROCK MONITORING WELL LOCATION
00891 ○	ALLUVIAL MONITORING WELL LOCATION
06691 ◉	SOURCE BOREHOLE/MONITORING WELL LOCATION OPEN OR FILLED DEPENDING ON ALLUVIAL OR BEDROCK SCREENED INTERVAL
111.4	INDIVIDUAL HAZARDOUS SUBSTANCE SITE LOCATION

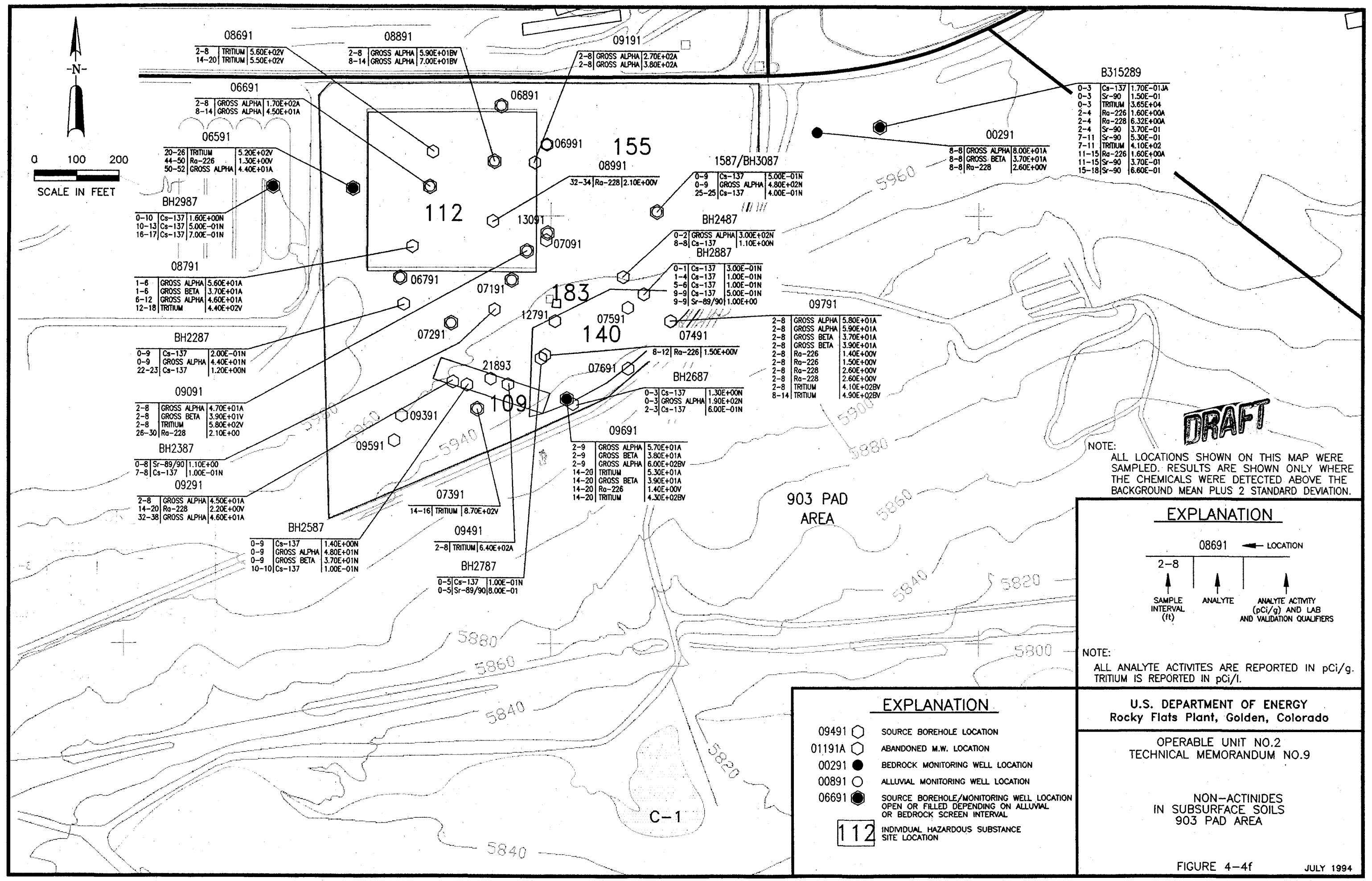
U.S. DEPARTMENT OF ENERGY
Rocky Flats Plant, Golden, Colorado

OPERABLE UNIT NO.2
TECHNICAL MEMORANDUM NO.9

ACTINIDES
IN SUBSURFACE SOILS
EAST IF IHSS AREA

FIGURE 4-4e JULY 1994

0U2TM935 1=1000



NOTE:
ALL LOCATIONS SHOWN ON THIS MAP WERE SAMPLED. RESULTS ARE SHOWN ONLY WHERE THE CHEMICALS WERE DETECTED ABOVE THE BACKGROUND MEAN PLUS 2 STANDARD DEVIATION.

EXPLANATION

08691 ← LOCATION

2-8

- 2-8: SAMPLE INTERVAL (ft)
- ANALYTE
- ANALYTE ACTIVITY (pCi/g) AND LAB AND VALIDATION QUALIFIERS

NOTE:
ALL ANALYTE ACTIVITES ARE REPORTED IN pCi/g. TRITIUM IS REPORTED IN pCi/l.

EXPLANATION

09491 ⬡	SOURCE BOREHOLE LOCATION
01191A ⬡	ABANDONED M.W. LOCATION
00291 ●	BEDROCK MONITORING WELL LOCATION
00891 ○	ALLUVIAL MONITORING WELL LOCATION
06691 ◉	SOURCE BOREHOLE/MONITORING WELL LOCATION OPEN OR FILLED DEPENDING ON ALLUVIAL OR BEDROCK SCREEN INTERVAL
112	INDIVIDUAL HAZARDOUS SUBSTANCE SITE LOCATION

U.S. DEPARTMENT OF ENERGY
Rocky Flats Plant, Golden, Colorado

OPERABLE UNIT NO.2
TECHNICAL MEMORANDUM NO.9

NON-ACTINIDES
IN SUBSURFACE SOILS
903 PAD AREA

FIGURE 4-4f JULY 1994

0U2TM936 1=200

-N-

0 100 200

SCALE IN FEET

MOUND AREA

5960

5940

5920

5900

B-1

B-2

5920

5940

5980

BH3287

8-15	TRITIUM	6.50E+02N
8-15	TRITIUM	6.90E+02N
15-16	TRITIUM	6.60E+02N
17-18	TRITIUM	4.80E+02N

BH3487

0-8	Cs-137	8.00E-01N
7-8	Cs-137	1.10E+00N
8-15	Cs-137	1.00E+00N
8-15	Cs-137	1.50E+00N
8-15	GROSS BETA	3.70E+01N
8-15	GROSS BETA	3.70E+01N
17-18	Cs-137	4.00E-01N
21-22	Cs-137	4.00E-01N

BH3787

11-12	Cs-137	8.00E-01N
18-22	Cs-137	4.70E+00N
18-22	TRITIUM	5.20E+02N

BH3887

20-21	Cs-137	3.00E-01N

BH3687

0-5	Cs-137	4.00E-01N
5-15	Cs-137	2.10E+00N
5-15	TRITIUM	4.00E+02N
18-20	Cs-137	1.00E+00N
23-25	Cs-137	2.30E+00N

BH3387

0-4	Cs-137	1.30E+00N
8-15	Cs-137	3.00E-01N
8-15	Cs-137	9.00E-01N
15-16	Cs-137	5.00E-01N
19-20	Cs-137	4.00E-01N
20-21	Cs-137	7.00E-01N

BH3587

0-12	Cs-137	6.00E-01N
0-12	Cs-137	1.00E+00N
12-15	Cs-137	9.00E-01N
14-15	Cs-137	6.00E-01N
18-19	Cs-137	1.00E-01N

BH3187

09991

21793

09891

154

153

113

108

DRAFT

NOTE:
ALL LOCATIONS SHOWN ON THIS MAP WERE SAMPLED. RESULTS ARE SHOWN ONLY WHERE THE CHEMICALS WERE DETECTED ABOVE THE BACKGROUND MEAN PLUS 2 STANDARD DEVIATION.

EXPLANATION

09491 ⬡	SOURCE BOREHOLE LOCATION
01191A ⬡	ABANDONED M.W. LOCATION
00291 ●	BEDROCK MONITORING WELL LOCATION
00891 ○	ALLUVIAL MONITORING WELL LOCATION
06691 ◉	SOURCE BOREHOLE/MONITORING WELL LOCATION OPEN OR FILLED DEPENDING ON ALLUVIAL OR BEDROCK SCREENED INTERVAL
113	INDIVIDUAL HAZARDOUS SUBSTANCE SITE LOCATION

EXPLANATION

09991 ← LOCATION

2-8

- 2-8: SAMPLE INTERVAL (ft)
- ANALYTE
- ANALYTE ACTIVITY (pCi/g) AND LAB AND VALIDATION QUALIFIERS

NOTE:
ALL ANALYTE ACTIVITES ARE REPORTED IN pCi/g. TRITIUM IS REPORTED IN pCi/l.

U.S. DEPARTMENT OF ENERGY
Rocky Flats Plant, Golden, Colorado

OPERABLE UNIT NO.2
TECHNICAL MEMORANDUM NO.9

NON-ACTINIDES
IN SUBSURFACE SOILS
MOUND AREA

FIGURE 4-4g JULY 1994

0U2TM937 1=200

-N-

0 100 200

SCALE IN FEET

B-1

B-2

B-3

B-4

5920 5900 5880 5860 5840 5820 5940

216.2

CENTRAL AVE.

DRAFT

BH4087

4-7	Sr-89/90	8.00E-01
7-9	Sr-89/90	1.00E+00

21193

BH4187

10391

10291

BH4287

111.1

110

10191

4-8	GROSS BETA	5.67E+01A
44-50	Ra-226	1.28E+00
50-54	Ra-226	1.23E+00

B217589

0-3	Sr-90	5.20E-01
0-3	TRITIUM	5.00E+02
4-7	Sr-90	7.00E-02
9-13	Cs-137	1.60E-01JA
9-13	Sr-90	1.10E-01
13-17	Ra-228	2.14E+00A
13-17	Sr-90	2.00E-01
17-22	Sr-90	1.08E+00
17-22	TRITIUM	6.50E+02

B218589

0-3	Cs-137	1.20E-01
0-3	Sr-90	2.00E-01
3-6	Sr-90	1.00E-01
10-11	Sr-90	1.60E-01
12-13	Sr-90	6.00E-02
18-22	Sr-90	2.90E-01

111.7

BH4687

07891

111.8

BH3987

12-14	Sr-89/90	1.10E+00
17-20	TRITIUM	4.00E+02N

BH4387

T-13

10491

8-14 | Ra-228 | 2.04E+00

BH4587

10-17 | GROSS ALPHA | 4.50E+01N

BH4487

22-24 | GROSS ALPHA | 5.10E+01N

B215389

0-3	Sr-90	3.70E-01
3-7	Cs-137	1.09E+00
3-7	Sr-90	4.70E-01
7-11	Sr-90	3.40E-01
12-15	Sr-90	5.60E-01
15-19	Sr-90	1.60E-01
19-23	Sr-90	5.90E-01
23-26	Sr-90	3.10E-01

B218789

0-2.9 | Tritium | 4.70E+02

B217389

19-21	Sr-89/90	1.13E+00
22-24	Sr-89/90	9.20E-01

NOTE:
ALL LOCATIONS SHOWN ON THIS MAP WERE SAMPLED. RESULTS ARE SHOWN ONLY WHERE THE CHEMICALS WERE DETECTED ABOVE THE BACKGROUND MEAN PLUS 2 STANDARD DEVIATION.

EXPLANATION

09491 ⬡ SOURCE BOREHOLE LOCATION

01191A ⬡ ABANDONED M.W. LOCATION

00291 ● BEDROCK MONITORING WELL LOCATION

00891 ○ ALLUVIAL MONITORING WELL LOCATION

06691 ◉ SOURCE BOREHOLE/MONITORING WELL LOCATION OPEN OR FILLED DEPENDING ON ALLUVIAL OR BEDROCK SCREENED INTERVAL

110 INDIVIDUAL HAZARDOUS SUBSTANCE SITE LOCATION

EXPLANATION

10291 ← LOCATION

2-8

SAMPLE INTERVAL (ft)

ANALYTE

ANALYTE ACTIVITY (pCi/g) AND LAB AND VALIDATION QUALIFIERS

NOTE:
ALL ANALYTE ACTIVITES ARE REPORTED IN pCi/g. TRITIUM IS REPORTED IN pCi/l.

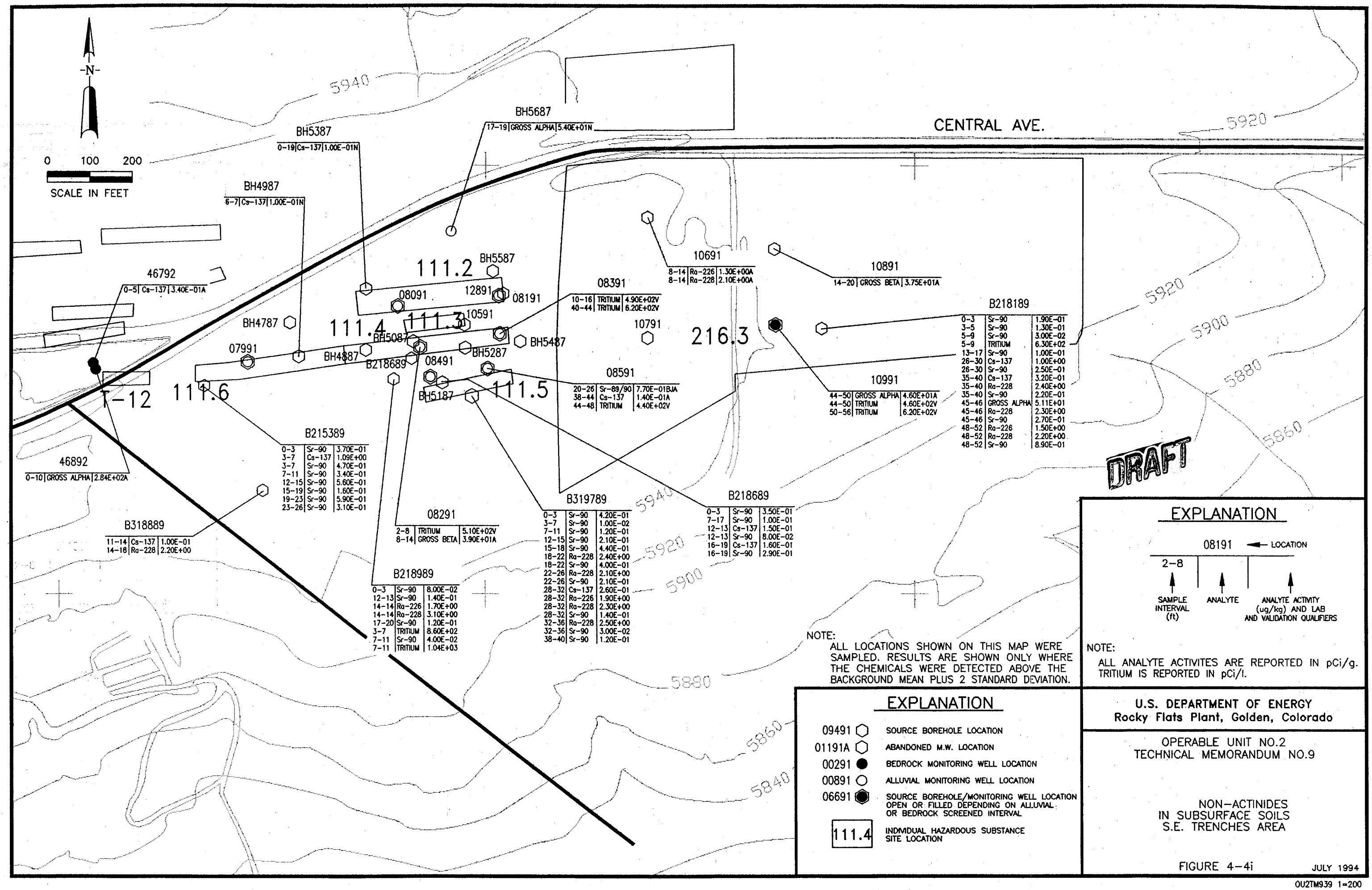
U.S. DEPARTMENT OF ENERGY
Rocky Flats Plant, Golden, Colorado

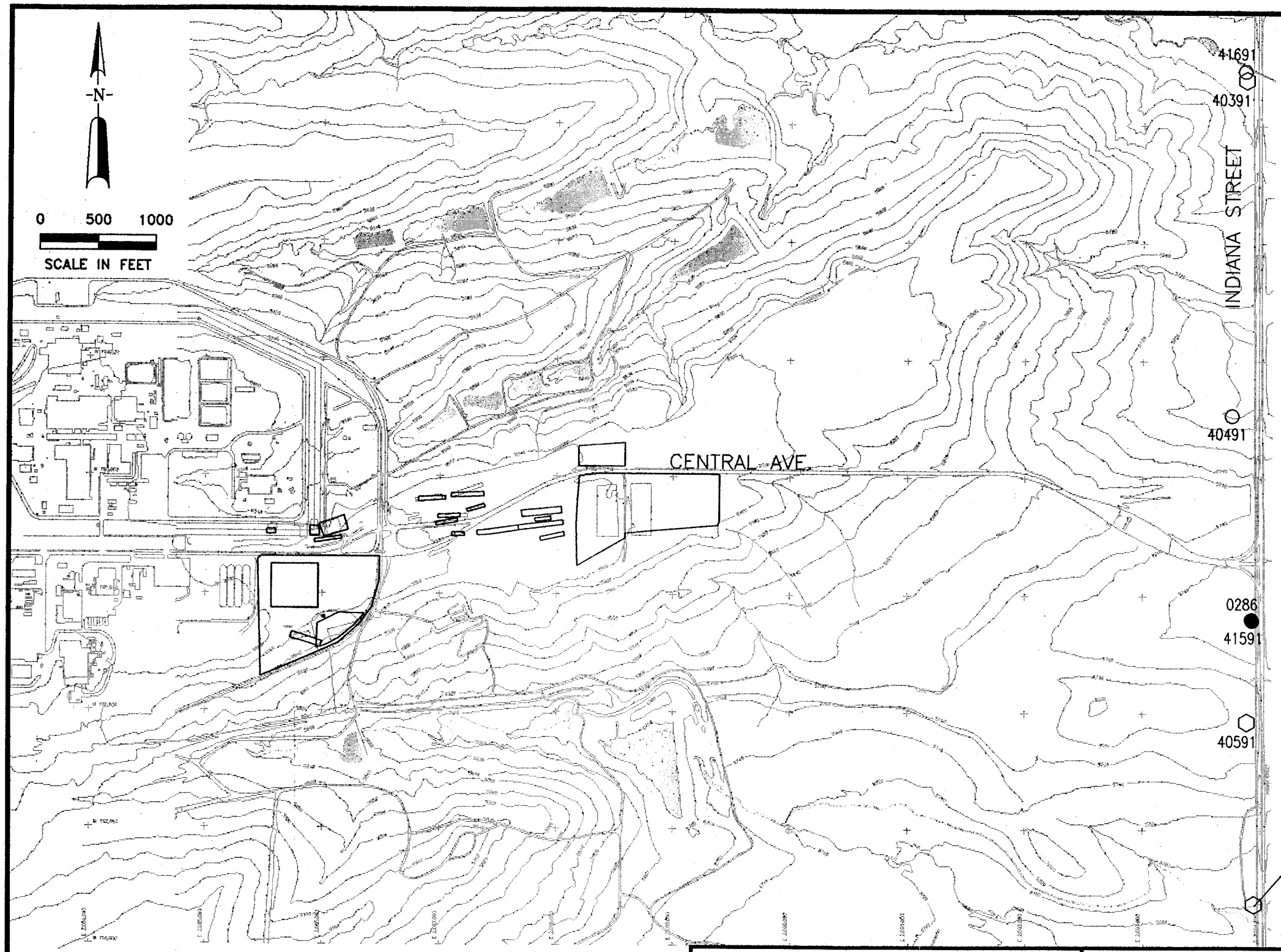
OPERABLE UNIT NO.2
PHASE II RFI/RI REPORT

NON-ACTINIDES
N.E. TRENCHES AREA
SUBSURFACE SOILS

FIGURE 4-4h JULY 1994

0U2TM938 1=200


-N-
0 100 200
SCALE IN FEET
CENTRAL AVE.
5940
5920
5900
5880
5860
5840
BH5387
0-19|Cs-137|1.00E-01N
BH5687
17-19|GROSS ALPHA|5.40E+01N
BH4987
6-7|Cs-137|1.00E-01N
46792
0-5|Cs-137|3.40E-01A
BH5587
111.2
08091
12891
08191
10591
BH4787
111.4
111.3
BH5087
BH5487
07991
BH4887
BH5287
08491
B218689
T-12
111.6
BH5187
111.5
08391
10-16|TRITIUM|4.90E+02V
40-44|TRITIUM|6.20E+02V
10691
8-14|Ra-226|1.30E+00A
8-14|Ra-228|2.10E+00A
10891
14-20|GROSS BETA|3.75E+01A
10791
216.3
08591
20-26|Sr-89/90|7.70E-01BJA
38-44|Cs-137|1.40E-01A
44-48|TRITIUM|4.40E+02V
B218189
0-3|Sr-90|1.90E-01
3-5|Sr-90|1.30E-01
5-9|Sr-90|3.00E-02
5-9|TRITIUM|6.30E+02
13-17|Sr-90|1.00E-01
26-30|Cs-137|1.00E+00
26-30|Sr-90|2.50E-01
35-40|Cs-137|3.20E-01
35-40|Ra-228|2.40E+00
35-40|Sr-90|2.20E-01
45-46|GROSS ALPHA|5.11E+01
45-46|Ra-228|2.30E+00
45-46|Sr-90|2.70E-01
48-52|Ra-226|1.50E+00
48-52|Ra-228|2.20E+00
48-52|Sr-90|8.90E-01
10991
44-50|GROSS ALPHA|4.60E+01A
44-50|TRITIUM|4.60E+02V
50-56|TRITIUM|6.20E+02V
B215389
0-3|Sr-90|3.70E-01
3-7|Cs-137|1.09E+00
3-7|Sr-90|4.70E-01
7-11|Sr-90|3.40E-01
12-15|Sr-90|5.60E-01
15-19|Sr-90|1.60E-01
19-23|Sr-90|5.90E-01
23-26|Sr-90|3.10E-01
46892
0-10|GROSS ALPHA|2.84E+02A
B318889
11-14|Cs-137|1.00E-01
14-18|Ra-228|2.20E+00
08291
2-8|TRITIUM|5.10E+02V
8-14|GROSS BETA|3.90E+01A
B218989
0-3|Sr-90|8.00E-02
12-13|Sr-90|1.40E-01
14-14|Ra-226|1.70E+00
14-14|Ra-228|3.10E+00
17-20|Sr-90|1.20E-01
3-7|TRITIUM|8.60E+02
7-11|Sr-90|4.00E-02
7-11|TRITIUM|1.04E+03
B319789
0-3|Sr-90|4.20E-01
3-7|Sr-90|1.00E-02
7-11|Sr-90|1.20E-01
12-15|Sr-90|2.10E-01
15-18|Sr-90|4.40E-01
18-22|Ra-228|2.40E+00
18-22|Sr-90|4.00E-01
22-26|Ra-228|2.10E+00
22-26|Sr-90|2.10E-01
28-32|Cs-137|2.60E-01
28-32|Ra-226|1.90E+00
28-32|Ra-228|2.30E+00
28-32|Sr-90|1.40E-01
32-36|Ra-228|2.50E+00
32-36|Sr-90|3.00E-02
38-40|Sr-90|1.20E-01
B218689
0-3|Sr-90|3.50E-01
7-17|Sr-90|1.00E-01
12-13|Cs-137|1.50E-01
12-13|Sr-90|8.00E-02
16-19|Cs-137|1.60E-01
16-19|Sr-90|2.90E-01
DRAFT
EXPLANATION
08191 ← LOCATION
2-8
SAMPLE INTERVAL (ft)
ANALYTE
ANALYTE ACTIVITY (ug/kg) AND LAB AND VALIDATION QUALIFIERS
NOTE:
ALL ANALYTE ACTIVITES ARE REPORTED IN pCi/g. TRITIUM IS REPORTED IN pCi/l.
NOTE:
ALL LOCATIONS SHOWN ON THIS MAP WERE SAMPLED. RESULTS ARE SHOWN ONLY WHERE THE CHEMICALS WERE DETECTED ABOVE THE BACKGROUND MEAN PLUS 2 STANDARD DEVIATION.
EXPLANATION
09491 SOURCE BOREHOLE LOCATION
01191A ABANDONED M.W. LOCATION
00291 BEDROCK MONITORING WELL LOCATION
00891 ALLUVIAL MONITORING WELL LOCATION
06691 SOURCE BOREHOLE/MONITORING WELL LOCATION OPEN OR FILLED DEPENDING ON ALLUVIAL OR BEDROCK SCREENED INTERVAL
111.4 INDIVIDUAL HAZARDOUS SUBSTANCE SITE LOCATION
U.S. DEPARTMENT OF ENERGY
Rocky Flats Plant, Golden, Colorado
OPERABLE UNIT NO.2
TECHNICAL MEMORANDUM NO.9
NON-ACTINIDES
IN SUBSURFACE SOILS
S.E. TRENCHES AREA
FIGURE 4-4i
JULY 1994
OU2TM939 1=200



NOTE:
ALL LOCATIONS SHOWN ON THIS MAP WERE SAMPLED. RESULTS ARE SHOWN ONLY WHERE THE CHEMICALS WERE DETECTED ABOVE THE BACKGROUND MEAN PLUS 2 STANDARD DEVIATION.

EXPLANATION

08691 ← LOCATION

0-11

- SAMPLE INTERVAL (ft)
- ANALYTE
- ANALYTE ACTIVITY (pCi/g) AND LAB AND VALIDATION QUALIFIERS

NOTE:
ALL ANALYTE ACTIVITES ARE REPORTED IN pCi/g. TRITIUM IS REPORTED IN pCi/l.

EXPLANATION

09491 ⬡	SOURCE BOREHOLE LOCATION
01191A ⬡	ABANDONED M.W. LOCATION
00291 ●	BEDROCK MONITORING WELL LOCATION
00891 ○	ALLUVIAL MONITORING WELL LOCATION
06691 ⬢	SOURCE BOREHOLE/MONITORING WELL LOCATION OPEN OR FILLED DEPENDING ON ALLUVIAL OR BEDROCK SCREENED INTERVAL
111.4	INDIVIDUAL HAZARDOUS SUBSTANCE SITE LOCATION

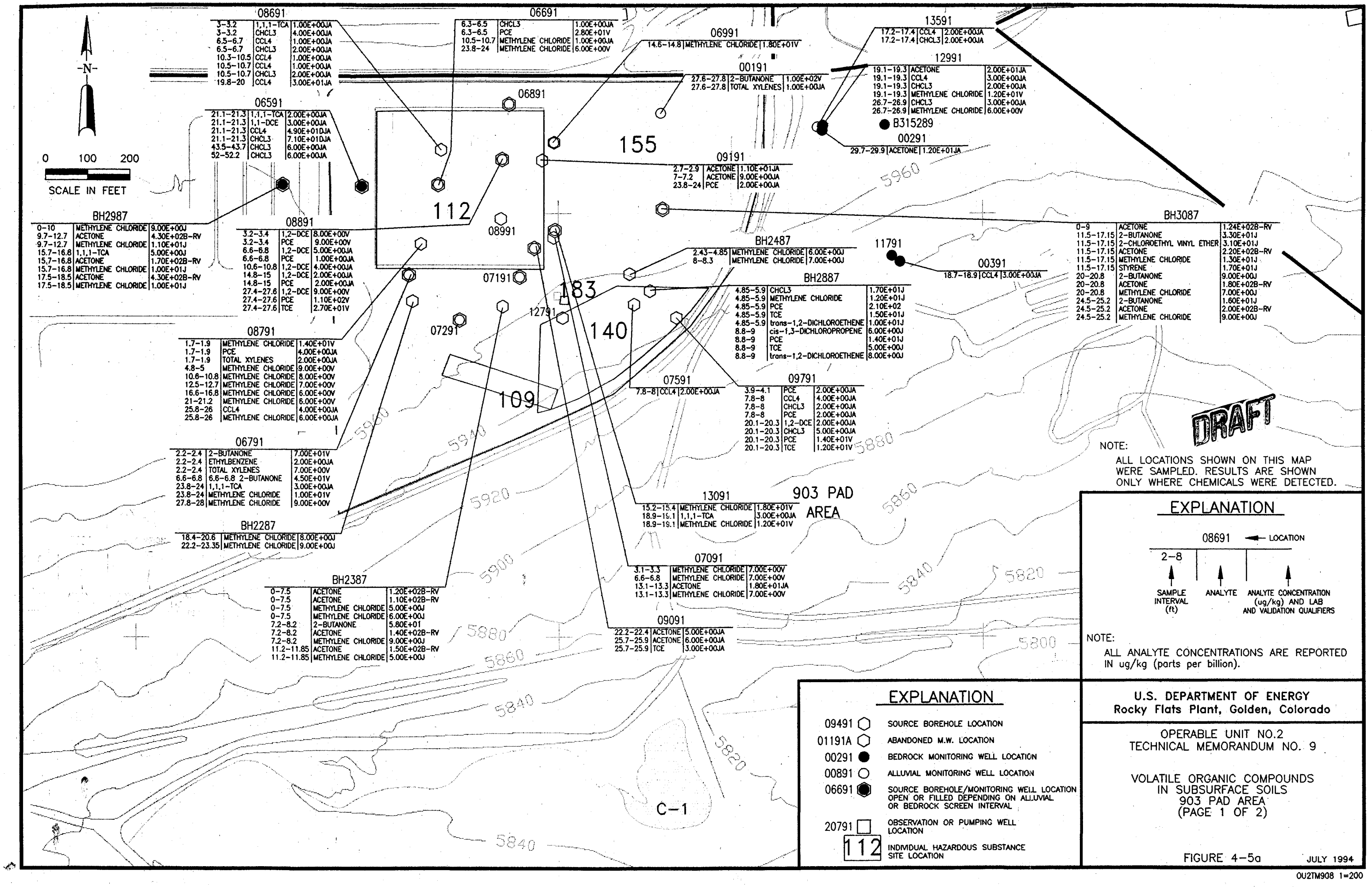
U.S. DEPARTMENT OF ENERGY
Rocky Flats Plant, Golden, Colorado

OPERABLE UNIT NO.2
TECHNICAL MEMORANDUM NO.9

NON-ACTINIDES
IN SUBSURFACE SOILS
EAST OF IHSS AREA

FIGURE 4-4j JULY 1994

OU2TM940 1=1000


N
0 100 200
SCALE IN FEET
08691
3-3.2 | 1,1,1-TCA | 1.00E+00JA
3-3.2 | CHCL3 | 4.00E+00JA
6.5-6.7 | CCL4 | 1.00E+00JA
6.5-6.7 | CHCL3 | 2.00E+00JA
10.3-10.5 | CCL4 | 1.00E+00JA
10.5-10.7 | CCL4 | 1.00E+00JA
10.5-10.7 | CHCL3 | 2.00E+00JA
19.8-20 | CCL4 | 3.00E+01JA
06691
6.3-6.5 | CHCL3 | 1.00E+00JA
6.3-6.5 | PCE | 2.80E+01V
10.5-10.7 | METHYLENE CHLORIDE | 1.00E+00JA
23.8-24 | METHYLENE CHLORIDE | 6.00E+00V
06991
14.6-14.8 | METHYLENE CHLORIDE | 1.80E+01V
00191
27.6-27.8 | 2-BUTANONE | 1.00E+02V
27.6-27.8 | TOTAL XYLENES | 1.00E+00JA
13591
17.2-17.4 | CCL4 | 2.00E+00JA
17.2-17.4 | CHCL3 | 2.00E+00JA
12991
19.1-19.3 | ACETONE | 2.00E+01JA
19.1-19.3 | CCL4 | 3.00E+00JA
19.1-19.3 | CHCL3 | 2.00E+00JA
19.1-19.3 | METHYLENE CHLORIDE | 1.20E+01V
26.7-26.9 | CHCL3 | 3.00E+00JA
26.7-26.9 | METHYLENE CHLORIDE | 6.00E+00V
B315289
00291
29.7-29.9 | ACETONE | 1.20E+01JA
06591
21.1-21.3 | 1,1,1-TCA | 2.00E+00JA
21.1-21.3 | 1,1-DCE | 3.00E+00JA
21.1-21.3 | CCL4 | 4.90E+01DJA
21.1-21.3 | CHCL3 | 7.10E+01DJA
43.5-43.7 | CHCL3 | 6.00E+00JA
52-52.2 | CHCL3 | 6.00E+00JA
06891
155
09191
2.7-2.9 | ACETONE | 1.10E+01JA
7-7.2 | ACETONE | 9.00E+00JA
23.8-24 | PCE | 2.00E+00JA
BH2987
0-10 | METHYLENE CHLORIDE | 9.00E+00J
9.7-12.7 | ACETONE | 4.30E+02B-RV
9.7-12.7 | METHYLENE CHLORIDE | 1.10E+01J
15.7-16.8 | 1,1,1-TCA | 5.00E+00J
15.7-16.8 | ACETONE | 1.70E+02B-RV
15.7-16.8 | METHYLENE CHLORIDE | 1.00E+01J
17.5-18.5 | ACETONE | 4.30E+02B-RV
17.5-18.5 | METHYLENE CHLORIDE | 1.00E+01J
08891
3.2-3.4 | 1,2-DCE | 8.00E+00V
3.2-3.4 | PCE | 9.00E+00V
6.6-6.8 | 1,2-DCE | 5.00E+00JA
6.6-6.8 | PCE | 1.00E+00JA
10.6-10.8 | 1,2-DCE | 4.00E+00JA
14.8-15 | 1,2-DCE | 2.00E+00JA
14.8-15 | PCE | 2.00E+00JA
27.4-27.6 | 1,2-DCE | 9.00E+00V
27.4-27.6 | PCE | 1.10E+02V
27.4-27.6 | TCE | 2.70E+01V
112
08991
07191
183
12791
140
07291
BH2487
2.43-4.85 | METHYLENE CHLORIDE | 6.00E+00J
8-8.3 | METHYLENE CHLORIDE | 7.00E+00J
11791
00391
18.7-18.9 | CCL4 | 3.00E+00JA
BH2887
4.85-5.9 | CHCL3 | 1.70E+01J
4.85-5.9 | METHYLENE CHLORIDE | 1.20E+01J
4.85-5.9 | PCE | 2.10E+02
4.85-5.9 | TCE | 1.50E+01J
4.85-5.9 | trans-1,2-DICHLOROETHENE | 1.00E+01J
8.8-9 | cis-1,3-DICHLOROPROPENE | 6.00E+00J
8.8-9 | PCE | 1.40E+01J
8.8-9 | TCE | 5.00E+00J
8.8-9 | trans-1,2-DICHLOROETHENE | 8.00E+00J
BH3087
0-9 | ACETONE | 1.24E+02B-RV
11.5-17.15 | 2-BUTANONE | 3.30E+01J
11.5-17.15 | 2-CHLOROETHYL VINYL ETHER | 3.10E+01J
11.5-17.15 | ACETONE | 2.20E+02B-RV
11.5-17.15 | METHYLENE CHLORIDE | 1.30E+01J
11.5-17.15 | STYRENE | 1.70E+01J
20-20.8 | 2-BUTANONE | 9.00E+00J
20-20.8 | ACETONE | 1.80E+02B-RV
20-20.8 | METHYLENE CHLORIDE | 7.00E+00J
24.5-25.2 | 2-BUTANONE | 1.60E+01J
24.5-25.2 | ACETONE | 2.00E+02B-RV
24.5-25.2 | METHYLENE CHLORIDE | 9.00E+00J
08791
1.7-1.9 | METHYLENE CHLORIDE | 1.40E+01V
1.7-1.9 | PCE | 4.00E+00JA
1.7-1.9 | TOTAL XYLENES | 2.00E+00JA
4.8-5 | METHYLENE CHLORIDE | 9.00E+00V
10.6-10.8 | METHYLENE CHLORIDE | 8.00E+00V
12.5-12.7 | METHYLENE CHLORIDE | 7.00E+00V
16.6-16.8 | METHYLENE CHLORIDE | 6.00E+00V
21-21.2 | METHYLENE CHLORIDE | 6.00E+00V
25.8-26 | CCL4 | 4.00E+00JA
25.8-26 | METHYLENE CHLORIDE | 6.00E+00JA
07591
7.8-8 | CCL4 | 2.00E+00JA
09791
3.9-4.1 | PCE | 2.00E+00JA
7.8-8 | CCL4 | 4.00E+00JA
7.8-8 | CHCL3 | 2.00E+00JA
7.8-8 | PCE | 2.00E+00JA
20.1-20.3 | 1,2-DCE | 2.00E+00JA
20.1-20.3 | CHCL3 | 5.00E+00JA
20.1-20.3 | PCE | 1.40E+01V
20.1-20.3 | TCE | 1.20E+01V
109
06791
2.2-2.4 | 2-BUTANONE | 7.00E+01V
2.2-2.4 | ETHYLBENZENE | 2.00E+00JA
2.2-2.4 | TOTAL XYLENES | 7.00E+00V
6.6-6.8 | 6.6-6.8 2-BUTANONE | 4.50E+01V
23.8-24 | 1,1,1-TCA | 3.00E+00JA
23.8-24 | METHYLENE CHLORIDE | 1.00E+01V
27.8-28 | METHYLENE CHLORIDE | 9.00E+00V
13091
15.2-15.4 | METHYLENE CHLORIDE | 1.80E+01V
18.9-19.1 | 1,1,1-TCA | 3.00E+00JA
18.9-19.1 | METHYLENE CHLORIDE | 1.20E+01V
903 PAD AREA
07091
3.1-3.3 | METHYLENE CHLORIDE | 7.00E+00V
6.6-6.8 | METHYLENE CHLORIDE | 7.00E+00V
13.1-13.3 | ACETONE | 1.80E+01JA
13.1-13.3 | METHYLENE CHLORIDE | 7.00E+00V
09091
22.2-22.4 | ACETONE | 5.00E+00JA
25.7-25.9 | ACETONE | 6.00E+00JA
25.7-25.9 | TCE | 3.00E+00JA
BH2287
18.4-20.6 | METHYLENE CHLORIDE | 8.00E+00J
22.2-23.35 | METHYLENE CHLORIDE | 9.00E+00J
BH2387
0-7.5 | ACETONE | 1.20E+02B-RV
0-7.5 | ACETONE | 1.10E+02B-RV
0-7.5 | METHYLENE CHLORIDE | 5.00E+00J
0-7.5 | METHYLENE CHLORIDE | 6.00E+00J
7.2-8.2 | 2-BUTANONE | 5.80E+01
7.2-8.2 | ACETONE | 1.40E+02B-RV
7.2-8.2 | METHYLENE CHLORIDE | 9.00E+00J
11.2-11.85 | ACETONE | 1.50E+02B-RV
11.2-11.85 | METHYLENE CHLORIDE | 5.00E+00J
5960
5940
5920
5900
5880
5860
5840
5820
5800
5880
C-1
DRAFT
NOTE:
ALL LOCATIONS SHOWN ON THIS MAP WERE SAMPLED. RESULTS ARE SHOWN ONLY WHERE CHEMICALS WERE DETECTED.
EXPLANATION
08691 ← LOCATION
2-8
SAMPLE INTERVAL (ft)
ANALYTE
ANALYTE CONCENTRATION (ug/kg) AND LAB AND VALIDATION QUALIFIERS
NOTE:
ALL ANALYTE CONCENTRATIONS ARE REPORTED IN ug/kg (parts per billion).
EXPLANATION
09491 SOURCE BOREHOLE LOCATION
01191A ABANDONED M.W. LOCATION
00291 BEDROCK MONITORING WELL LOCATION
00891 ALLUVIAL MONITORING WELL LOCATION
06691 SOURCE BOREHOLE/MONITORING WELL LOCATION OPEN OR FILLED DEPENDING ON ALLUVIAL OR BEDROCK SCREEN INTERVAL
20791 OBSERVATION OR PUMPING WELL LOCATION
112 INDIVIDUAL HAZARDOUS SUBSTANCE SITE LOCATION
U.S. DEPARTMENT OF ENERGY
Rocky Flats Plant, Golden, Colorado
OPERABLE UNIT NO.2
TECHNICAL MEMORANDUM NO. 9
VOLATILE ORGANIC COMPOUNDS IN SUBSURFACE SOILS
903 PAD AREA
(PAGE 1 OF 2)
FIGURE 4-5a
JULY 1994
0U2TM908 1=200

-N-

0 100 200

SCALE IN FEET

BH2587

0-9	ACETONE	1.10E+02B-RV
0-9	ACETONE	4.40E+01J
0-9	CHLOROETHANE	7.00E+00J
0-9	ETHYLBENZENE	1.10E+01J
0-9	METHYLENE CHLORIDE	1.50E+01J
0-9	METHYLENE CHLORIDE	1.90E+01J
0-9	PCE	8.00E+00J
0-9	PCE	1.30E+02
0-9	TCE	1.00E+02
0-9	TCE	9.70E+01
0-9	TOTAL XYLENES	6.00E+01
8.4-8.85	2-BUTANONE	1.60E+01J
8.4-8.85	ACETONE	3.40E+02
8.4-8.85	METHYLENE CHLORIDE	1.20E+01J
8.4-8.85	TCE	9.30E+01
9.5-10.4	2-BUTANONE	6.00E+00J
9.5-10.4	PCE	2.80E+01
9.5-10.4	TCE 5.10E+01	5.10E+01
14.5-15.7		2.10E+02J
14.5-15.7	ACETONE	1.10E+03B-RV
14.5-15.7	ETHYLBENZENE	7.80E+02
14.5-15.7	PCE	1.00E+04
14.5-15.7	TCE	7.00E+03
14.5-15.7	TOTAL XYLENES	3.30E+03
18.5-19.3	1,1,1-TCA	7.50E+01J
18.5-19.3	4-METHYL-2-PENTANONE	1.20E+02J
18.5-19.3	ACETONE	7.60E+02B-RV
18.5-19.3	CHCL3	1.30E+02J
18.5-19.3	CHLOROETHANE	5.00E+01J
18.5-19.3	ETHYLBENZENE	2.90E+02
18.5-19.3	METHYLENE CHLORIDE	1.50E+02JB-RV
18.5-19.3	PCE	3.80E+03
18.5-19.3	TCE	1.60E+04
18.5-19.3	TOTAL XYLENES	4.80E+02

07191

23.8-24	1,1-DCE	1.00E+00JA
23.8-24	PCE	1.40E+01V
23.8-24	TCE	1.20E+01V

09491

3.8-4	TCE	5.00E+00JA

13091

15.2-15.4	METHYLENE CHLORIDE	1.80E+01V
18.9-19.1	1,1,1-TCA	3.00E+00JA
18.9-19.1	METHYLENE CHLORIDE	1.20E+01V

BH2787

0-4.8	ACETONE	1.40E+02B-RV
0-4.8	METHYLENE CHLORIDE	7.00E+00J
4.8-10	ACETONE	1.40E+02B-RV
4.8-10	METHYLENE CHLORIDE	5.00E+00J
13-14.4	ACETONE	1.70E+02B-RV
13-14.4	METHYLENE CHLORIDE	6.00E+00J

07491

11.5-11.7	CHCL3	4.00E+00JA

07691

3.7-3.9	METHYLENE CHLORIDE	6.00E+00JA
7.8-8	CHCL3	2.00E+00JA
7.8-8	METHYLENE CHLORIDE	4.00E+00JA
7.8-8	TCE	4.00E+00JA

BH2687

0.3-2.5	ACETONE	2.30E+01
6-6.9	ACETONE	1.20E+02
6-6.9	METHYLENE CHLORIDE	8.00E+00J

09291

7.6-7.8	TCE	4.00E+01V

21893

10.4-10.7	TCE	1.80E+01V
10.7-11	TCE	4.20E+01V
23.1-23.4	TCE	5.70E+03JA
26.9-27.2	TCE	3.00E+00JA
29.2-29.5	TCE	7.00E+00V

07391

2.4-2.6	TCE	5.00E+00JA
2.4-2.6	TOTAL XYLENES	4.00E+00JA
2.6-2.8	METHYLENE CHLORIDE	3.00E+00JA
2.6-2.8	PCE	2.00E+00JA
2.6-2.8	TCE	1.90E+01V
6.8-7	METHYLENE CHLORIDE	4.00E+00JA
6.8-7	PCE	4.00E+00JA
6.8-7	TCE	1.10E+02V
6.8-7	TOTAL XYLENES	2.00E+00JA
11-11.2	CHCL3	1.90E+01JA
11-11.2	METHYLENE CHLORIDE	1.80E+01JA
11-11.2	TCE	4.20E+02V
15.8-16	CHCL3	4.00E+00JA
15.8-16	METHYLENE CHLORIDE	4.00E+00JA
15.8-16	TCE	2.90E+02V

09691

8.2-8.4	TCE	1.00E+01V
11.8-12	PCE	3.00E+00JA
11.8-12	TCE	4.40E+01V
15.8-16	CHCL3	2.00E+00JA
15.8-16	TCE	2.20E+01V
19.6-19.8	TCE	1.00E+00JA

00491

18.3-18.5	CHCL3	2.00E+00JA

00891

18.7-18.9	ACETONE	9.00E+00J

00591

5.5-5.7	TOTAL XYLENES	8.90E+01V

01291

14.3-14.5	1,1,1-TCA	1.00E+01V
14.3-14.5	CHCL3	2.00E+00JA
14.3-14.5	METHYLENE CHLORIDE	6.00E+00JA

00991

13.3-13.5	ACETONE	1.40E+01JA
13.3-13.5	TOTAL XYLENES	3.00E+00JA

155 112 183 140 109

00791 00691 05991 01191A 01091A

903 PAD AREA

C-1

5980 5960 5940 5920 5900 5880 5860 5840 5820 5800

DRAFT

NOTE:
ALL LOCATIONS SHOWN ON THIS MAP WERE SAMPLED. RESULTS ARE SHOWN ONLY WHERE CHEMICALS WERE DETECTED.

EXPLANATION

08691 ← LOCATION

2-8

SAMPLE INTERVAL (ft) | ANALYTE | ANALYTE CONCENTRATION (ug/kg) AND LAB AND VALIDATION QUALIFIERS

NOTE:
ALL ANALYTE CONCENTRATIONS ARE REPORTED IN ug/kg (parts per billion).

EXPLANATION

09491 ⬡	SOURCE BOREHOLE LOCATION
01191A ⬡	ABANDONED M.W. LOCATION
00291 ●	BEDROCK MONITORING WELL LOCATION
00891 ○	ALLUVIAL MONITORING WELL LOCATION
06691 ⬢	SOURCE BOREHOLE/MONITORING WELL LOCATION OPEN OR FILLED DEPENDING ON ALLUVIAL OR BEDROCK SCREEN INTERVAL
20791 □	OBSERVATION OR PUMPING WELL LOCATION
112	INDIVIDUAL HAZARDOUS SUBSTANCE SITE LOCATION

U.S. DEPARTMENT OF ENERGY
Rocky Flats Plant, Golden, Colorado

OPERABLE UNIT NO.2
TECHNICAL MEMORANDUM NO. 9

VOLATILE ORGANIC COMPOUNDS
IN SUBSURFACE SOILS
903 PAD AREA
(PAGE 2 OF 2)

FIGURE 4-5a JULY 1994

OU2TM909 1=200

-N-

0 100 200

SCALE IN FEET

MOUND AREA

B-1

B-2

5920

5900

5940

5920

5940

BH3787

0-5	ACETONE	2.80E+01
0-5	ACETONE	2.50E+01
0-5	METHYLENE CHLORIDE	3.74E+01
0-5	METHYLENE CHLORIDE	1.00E+01
18-21.7	ACETONE	1.30E+02B-RV
18-21.7	cis-1,3-DICHLOROPROPENE	6.00E+00J
25-26.2	ACETONE	1.50E+02B-RV

BH3687

0-5	ACETONE	1.90E+01J
0-5	ACETONE	5.30E+01
0-5	METHYLENE CHLORIDE	9.00E+00J
0-5	METHYLENE CHLORIDE	7.00E+00J
5-15	ACETONE	5.10E+01
5-15	METHYLENE CHLORIDE	1.10E+01J
23.4-24.5	ACETONE	6.40E+01
23.4-24.5	METHYLENE CHLORIDE	8.00E+00J

BH3387

0-4	ACETONE	1.30E+02
7.8-14.7	1,2-DCA	1.20E+01J
7.8-14.7	1,2-DCA	1.20E+01J
7.8-14.7	ACETONE	1.90E+02
7.8-14.7	ACETONE	1.60E+02
14.7-15.9	1,2-DCA	1.10E+01J
14.7-15.9	ACETONE	1.70E+02
18.9-19.8	1,2-DCA	1.00E+01J
18.9-19.8	ACETONE	3.20E+02
18.9-19.8	METHYLENE CHLORIDE	1.40E+01J
19.5-20.8	1,2-DCA	7.00E+00J
19.5-20.8	ACETONE	9.60E+01
19.5-20.8	METHYLENE CHLORIDE	1.50E+01J

BH3287

0-8	1,2-DCA	2.90E+01
0-8	ACETONE	9.90E+01
0-8	METHYLENE CHLORIDE	
8-15	1,2-DCA	9.00E+00J
8-15	1,2-DCA	1.10E+01J
8-15	ACETONE	9.10E+01
8-15	ACETONE	1.20E+02
8-15	METHYLENE CHLORIDE	6.00E+00J
8-15	METHYLENE CHLORIDE	9.00E+00J
15.1-16.2	ACETONE	8.60E+01
17.2-18	1,2-DCA	1.90E+01J
17.2-18	ACETONE	1.70E+02

02191

20.2-20.4	PCE	1.50E+02DJA
20.2-20.4	TCE	6.70E+01JA

02291

11.7-11.9	PCE	1.40E+01
11.7-11.9	TCE	2.00E+00J

02491

09991

3.1-3.3	PCE	5.00E+00J
6.8-7	METHYLENE CHLORIDE	1.30E+01
6.8-7	PCE	8.00E+00
11-11.2	ACETONE	2.50E+01
11-11.2	METHYLENE CHLORIDE	1.40E+01
11-11.2	PCE	1.30E+01
15.6-15.8	METHYLENE CHLORIDE	1.20E+01
15.6-15.8	PCE	4.80E+01
15.6-15.8	TCE	7.00E+00
17.6-17.8	METHYLENE CHLORIDE	7.00E+00
17.6-17.8	PCE	1.00E+02
17.6-17.8	TCE	2.00E+01
19.6-19.8	METHYLENE CHLORIDE	1.30E+01
19.6-19.8	PCE	1.80E+02
19.6-19.8	TCE	1.90E+01

21793

23.1-23.4	PCE	1.30E+02V
23.1-23.4	TCE	5.00E+00JA
27.5-27.8	PCE	1.70E+02V
27.5-27.8	TCE	2.00E+00JA
31.6-31.9	PCE	1.00E+02V
31.6-31.9	TCE	2.00E+00JA
35.1-35.4	PCE	3.20E+01V
39-39.3	PCE	4.00E+00JA
42.9-43.2	PCE	5.00E+00JA
47-47.3	PCE	5.00E+00JA
49.7-50	PCE	7.00E+00V

BH3887

0-9.5	METHYLENE CHLORIDE	1.20E+01J
20.4-21.3	METHYLENE CHLORIDE	1.20E+01J

DRAFT

09891

3.1-3.3	METHYLENE CHLORIDE	1.10E+01
6.3-6.5	METHYLENE CHLORIDE	8.00E+00
6.3-6.5	PCE	1.00E+00J
10.5-10.7	METHYLENE CHLORIDE	1.00E+01
10.5-10.7	PCE	3.00E+00J
15.6-15.8	METHYLENE CHLORIDE	1.20E+01

02091

154

153

113

108

01891

12091

20791

01391

13.6-13.8	1,2-DCE	3.70E+01V
13.6-13.8	PCE	2.00E+00JA
15.6-15.8	1,2-DCE	2.00E+00JA

01791

9.6-9.8	ACETONE	2.10E+01JA
9.6-9.8	PCE	3.00E+00JA

BH3187

0-11.7	1,2-DCA	1.00E+01J
0-11.7	1,2-DCA	6.00E+00J
0-11.7	ACETONE	7.00E+01
0-11.7	ACETONE	8.90E+01
0-11.7	METHYLENE CHLORIDE	1.00E+01J
0-11.7	METHYLENE CHLORIDE	1.70E+01J
0-11.7	PCE	8.00E+00J
0-11.7	PCE	1.60E+01J
11.7-12.6	1,2-DCA	3.20E+01
11.7-12.6	ACETONE	1.00E+02
11.7-12.6	METHYLENE CHLORIDE	1.50E+01J
11.7-12.6	PCE	2.00E+01J
15.7-22.85	1,2-DCA	5.00E+00J
15.7-22.85	ACETONE	1.10E+02
15.7-22.85	METHYLENE CHLORIDE	9.00E+00J

12291

13.3-13.5	METHYLENE CHLORIDE	7.00E+00V
13.3-13.5	PCE	4.30E+01V

01491

3.4-3.6	METHYLENE CHLORIDE	6.00E+00
3.4-3.6	PCE	5.00E+00J
14.9-15.1	ACETONE	2.50E+01

BH3487

0-8	ACETONE	2.10E+02
6.6-8	ACETONE	3.50E+02
8-14.7	ACETONE	5.00E+02
8-14.7	ACETONE	2.20E+02
17-18	ACETONE	2.10E+02
21-22.1	ACETONE	1.30E+02

BH3587

0-12.3	ACETONE	3.10E+02
0-12.3	ACETONE	3.60E+02
14.1-15.4	ACETONE	4.80E+02
18.4-19.45	ACETONE	2.80E+02

NOTE:

ALL LOCATIONS SHOWN ON THIS MAP WERE SAMPLED. RESULTS ARE SHOWN ONLY WHERE CHEMICALS WERE DETECTED.

EXPLANATION

09491 ⬡ SOURCE BOREHOLE LOCATION

01191A ⬡ ABANDONED M.W. LOCATION

00291 ● BEDROCK MONITORING WELL LOCATION

00891 ○ ALLUVIAL MONITORING WELL LOCATION

06691 ◉ SOURCE BOREHOLE/MONITORING WELL LOCATION OPEN OR FILLED DEPENDING ON ALLUVIAL OR BEDROCK SCREENED INTERVAL

20791 □ OBSERVATION OR PUMPING WELL LOCATION

113 INDIVIDUAL HAZARDOUS SUBSTANCE SITE LOCATION

EXPLANATION

09991 ← LOCATION

2-8 ↑ SAMPLE INTERVAL (ft)

↑ ANALYTE

↑ ANALYTE CONCENTRATION (ug/Kg) AND LAB AND VALIDATION QUALIFIERS

NOTE:

ALL ANALYTE CONCENTRATIONS ARE REPORTED IN ug/kg (parts per billion).

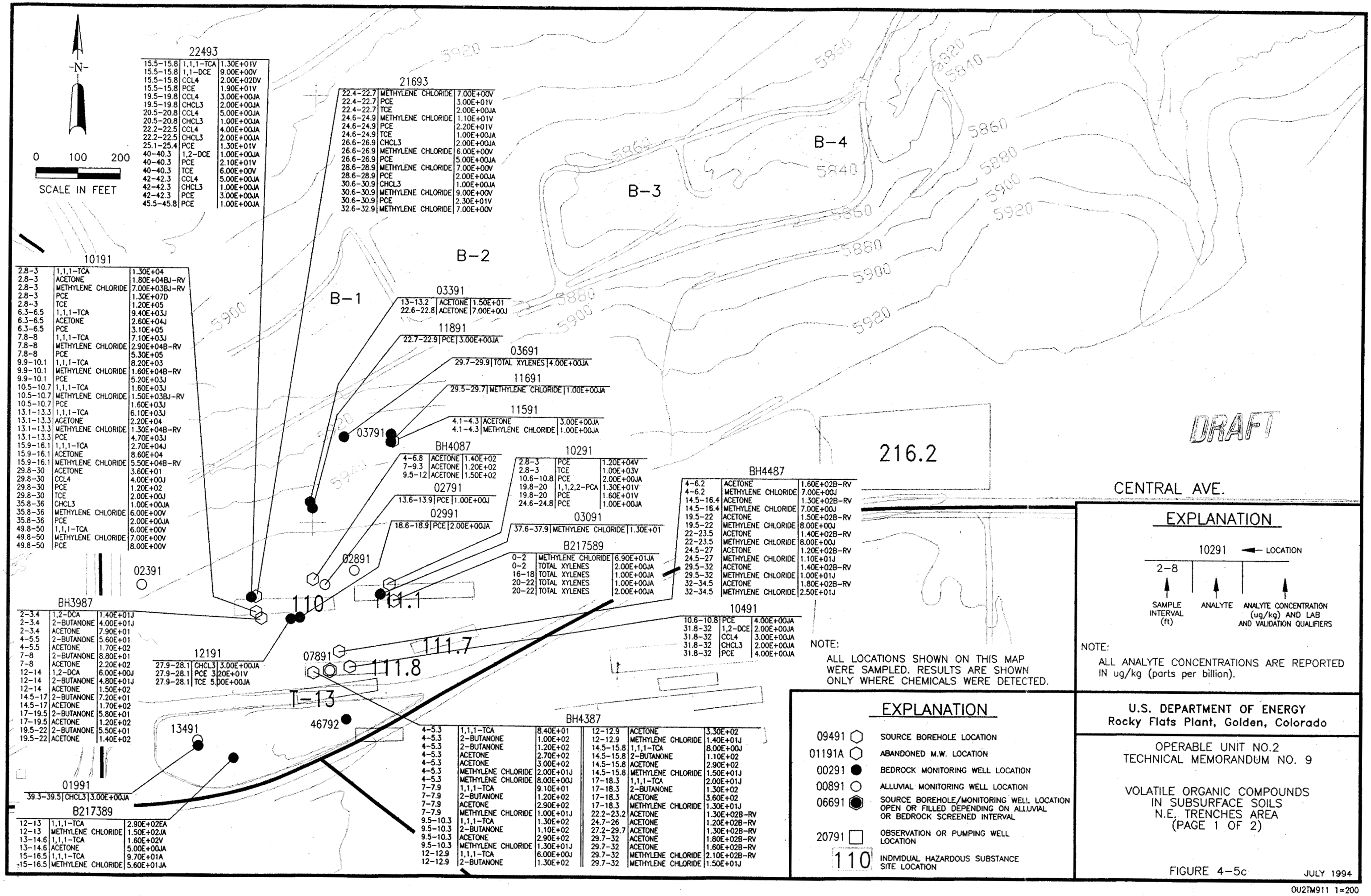
U.S. DEPARTMENT OF ENERGY
Rocky Flats Plant, Golden, Colorado

OPERABLE UNIT NO.2
TECHNICAL MEMORANDUM NO. 9

VOLATILE ORGANIC COMPOUNDS
IN SUBSURFACE SOILS
MOUND AREA

FIGURE 4-5b JULY 1994

0U2TM910 1=200



NOTE:
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EXPLANATION

09491 ⬡ SOURCE BOREHOLE LOCATION
01191A ⬡ ABANDONED M.W. LOCATION
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00891 ○ ALLUVIAL MONITORING WELL LOCATION
06691 ◉ SOURCE BOREHOLE/MONITORING WELL LOCATION OPEN OR FILLED DEPENDING ON ALLUVIAL OR BEDROCK SCREENED INTERVAL
20791 □ OBSERVATION OR PUMPING WELL LOCATION
110 INDIVIDUAL HAZARDOUS SUBSTANCE SITE LOCATION

EXPLANATION

10291 ← LOCATION
2–8
SAMPLE INTERVAL (ft)
ANALYTE
ANALYTE CONCENTRATION (ug/kg) AND LAB AND VALIDATION QUALIFIERS

NOTE:
ALL ANALYTE CONCENTRATIONS ARE REPORTED IN ug/kg (parts per billion).

U.S. DEPARTMENT OF ENERGY
Rocky Flats Plant, Golden, Colorado

OPERABLE UNIT NO.2
TECHNICAL MEMORANDUM NO. 9

VOLATILE ORGANIC COMPOUNDS
IN SUBSURFACE SOILS
N.E. TRENCHES AREA
(PAGE 1 OF 2)

FIGURE 4–5c JULY 1994

0U2TM911 1=200

-N-

0 100 200

SCALE IN FEET

5920 5900 5880 5860 5840 5820

B-1 B-2 B-3 B-4

02591

13391
38-38.2 | 4-METHYL-2-PENTANONE | 2.00E+00JA

04091

03991

06091

11291
26.6-26.8 | ACETONE | 3.00E+00JA

DRAFT

12691
34.6-34.8 | PCE | 6.00E+00V
34.6-34.8 | TCE | 1.20E+01V

11991
8.7-8.9 | ACETONE | 1.00E+01J

12491
30.9-31.1 | PCE | 3.00E+00JA

10391
23.1-23.3 | CCL4 | 3.00E+00JA
32.7-32.9 | CHCL3 | 3.00E+00JA
32.7-32.9 | PCE | 5.00E+00JA
32.7-32.9 | TCE | 2.10E+01V

03891

03491A

BH4187
9.5-10.8 | ACETONE | 2.10E+02
9.5-10.8 | BENZENE | 1.20E+01J
12-14.5 | ACETONE | 1.50E+02
14.5-17 | ACETONE | 2.10E+02
17-19.5 | ACETONE | 1.50E+02
17-19.5 | CHCL3 | 7.00E+00J
17-19.5 | TCE | 3.40E+01

20291
20191
05691
11491
11391A
03591

B218589
16-17 | ACETONE | 1.20E+01V
20-21.8 | ACETONE | 1.00E+01JA
24-25.3 | ACETONE | 6.00E+00JA

12391
216.2
05391

CENTRAL AVE.

BH4287
7-8.3 | ACETONE | 1.00E+02
17-18.8 | ACETONE | 7.10E+01
24.5-27 | ACETONE | 1.10E+02
27-29.5 | ACETONE | 1.40E+02
45.5-47 | ACETONE | 7.80E+01

24193
35.6-35.9 | ETHYLBENZENE | 2.00E+00JY
35.6-35.9 | METHYLENE CHLORIDE | 1.00E+01JY
35.6-35.9 | PCE | 5.00E+00JY

12591A
03191

OB20391
28.9-29.1 | CHCL3 | 2.00E+00JA

PW20091
26-26.2 | BENZENE | 2.00E+00JA
26-26.2 | CHLOROBENZENE | 4.00E+00JA
26-26.2 | TCE | 1.00E+00JA

110

111.1

BH4587
27.5-30 | 1,1,1-TCA | 1.80E+02

111.7

111.8

T-13

BH4687
17-17.8 | 1,1,1-TCA | 1.90E+02
24.5-25.1 | ACETONE | 2.10E+02B-RV
24.5-25.1 | METHYLENE CHLORIDE | 5.00E+00J
27-29.5 | ACETONE | 1.70E+02B-RV
29.5-32 | ACETONE | 2.70E+02B-RV
29.5-32 | METHYLENE CHLORIDE | 7.00E+00J

24093
1.6-1.8 | METHYLENE CHLORIDE | 8.00E+00Y
1.6-1.8 | METHYLENE CHLORIDE | 1.20E+01Y
1.6-1.8 | PCE | 1.70E+01Y
1.6-1.8 | PCE | 1.50E+01Y
7.6-7.8 | METHYLENE CHLORIDE | 4.00E+00JY
15.1-15.3 | METHYLENE CHLORIDE | 1.30E+01Y
15.1-15.3 | PCE | 2.30E+01Y

24793
7.7-8 | PCE | 2.60E+05V
7.7-8 | PCE | 1.10E+06V
7.7-8 | TCE | 8.10E+03JA

24593
7.5-7.8 | METHYLENE CHLORIDE | 2.00E+01Y

24693
7.5-7.8 | METHYLENE CHLORIDE | 5.00E+00JY
7.5-7.8 | PCE | 2.00E+00JY

B218789
24-25.8 | CHCl3 | 1.20E+01V
24-25.8 | PCE | 2.00E+00JA
34-36 | METHYLENE CHLORIDE | 5.00E+00JB

NOTE:
ALL LOCATIONS SHOWN ON THIS MAP WERE SAMPLED. RESULTS ARE SHOWN ONLY WHERE CHEMICALS WERE DETECTED.

EXPLANATION

09491 ⬡ SOURCE BOREHOLE LOCATION

01191A ⬡ ABANDONED M.W. LOCATION

00291 ● BEDROCK MONITORING WELL LOCATION

00891 ○ ALLUVIAL MONITORING WELL LOCATION

06691 ◉ SOURCE BOREHOLE/MONITORING WELL LOCATION OPEN OR FILLED DEPENDING ON ALLUVIAL OR BEDROCK SCREENED INTERVAL

20791 □ OBSERVATION OR PUMPING WELL LOCATION

110 INDIVIDUAL HAZARDOUS SUBSTANCE SITE LOCATION

EXPLANATION

10291 ← LOCATION

2-8

SAMPLE INTERVAL (ft) | ANALYTE | ANALYTE CONCENTRATION (ug/kg) AND LAB AND VALIDATION QUALIFIERS

NOTE:
ALL ANALYTE CONCENTRATIONS ARE REPORTED IN ug/kg (parts per billion).

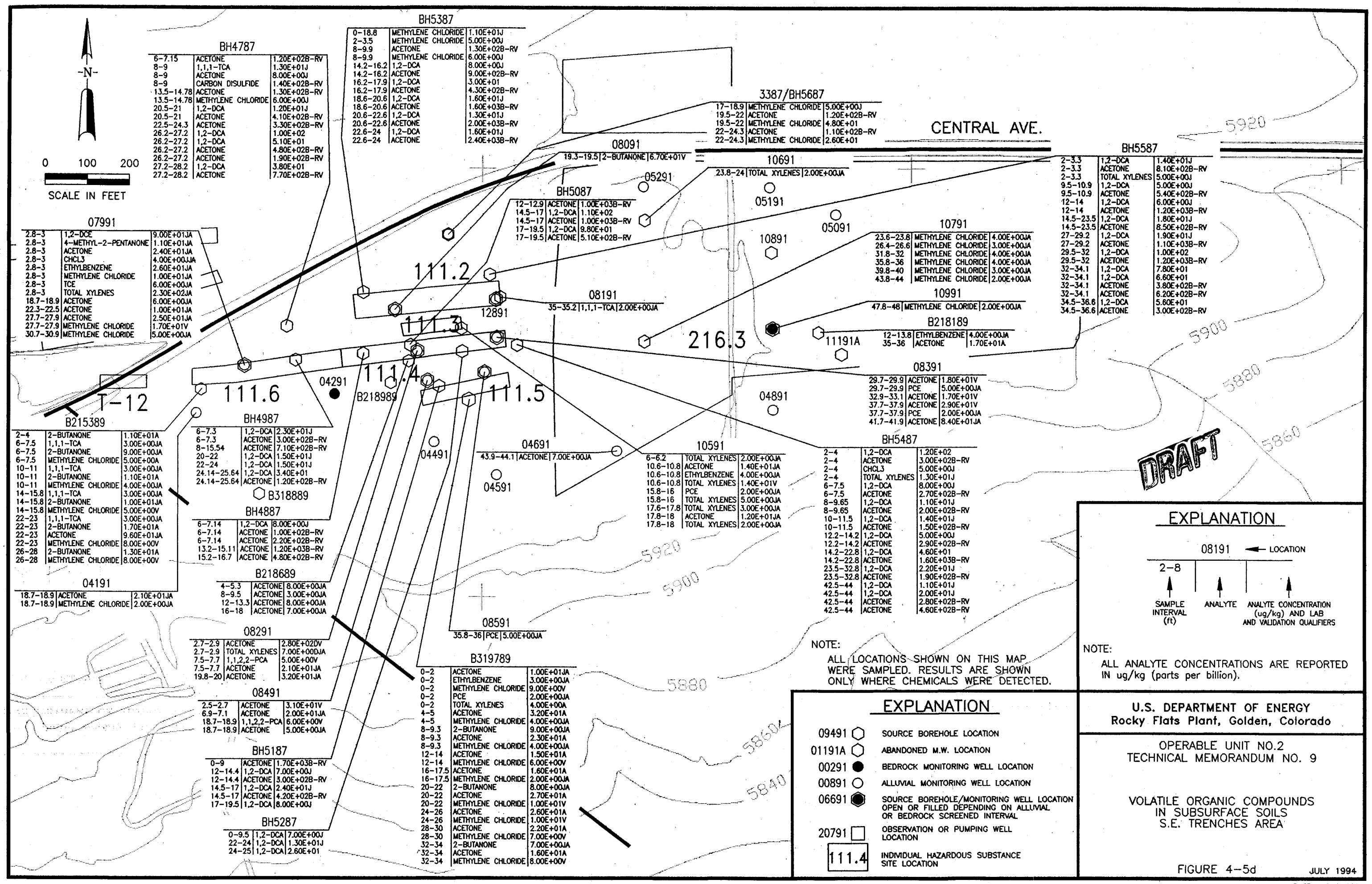
U.S. DEPARTMENT OF ENERGY
Rocky Flats Plant, Golden, Colorado

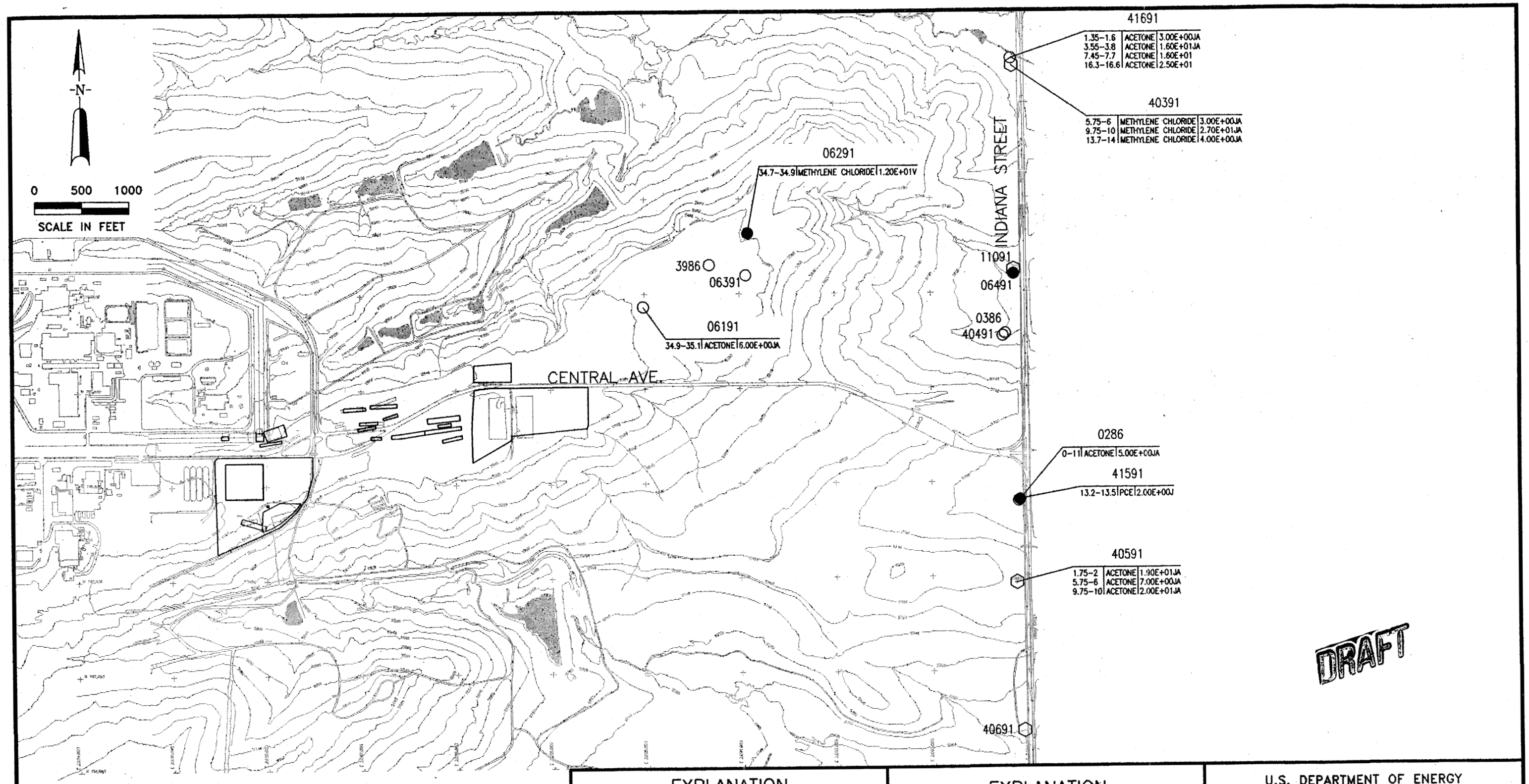
OPERABLE UNIT NO.2
TECHNICAL MEMORANDUM NO. 9

VOLATILE ORGANIC COMPOUNDS
IN SUBSURFACE SOILS
N.E. TRENCHES AREA
(PAGE 2 OF 2)

FIGURE 4-5c JULY 1994

0U2TM912 1=200


-N-
0 100 200
SCALE IN FEET
BH4787
6-7.15 ACETONE 1.20E+02B-RV
8-9 1,1,1-TCA 1.30E+01J
8-9 ACETONE 8.00E+00J
8-9 CARBON DISULFIDE 1.40E+02B-RV
13.5-14.78 ACETONE 1.30E+02B-RV
13.5-14.78 METHYLENE CHLORIDE 6.00E+00J
20.5-21 1,2-DCA 1.20E+01J
20.5-21 ACETONE 4.10E+02B-RV
22.5-24.3 ACETONE 3.30E+02B-RV
26.2-27.2 1,2-DCA 1.00E+02
26.2-27.2 1,2-DCA 5.10E+01
26.2-27.2 ACETONE 4.80E+02B-RV
26.2-27.2 ACETONE 1.90E+02B-RV
27.2-28.2 1,2-DCA 3.80E+01
27.2-28.2 ACETONE 7.70E+02B-RV
BH5387
0-18.8 METHYLENE CHLORIDE 1.10E+01J
2-3.5 METHYLENE CHLORIDE 5.00E+00J
8-9.9 ACETONE 1.30E+02B-RV
8-9.9 METHYLENE CHLORIDE 6.00E+00J
14.2-16.2 1,2-DCA 8.00E+00J
14.2-16.2 ACETONE 9.00E+02B-RV
16.2-17.9 1,2-DCA 3.00E+01
16.2-17.9 ACETONE 4.30E+02B-RV
18.6-20.6 1,2-DCA 1.60E+01J
18.6-20.6 ACETONE 1.60E+03B-RV
20.6-22.6 1,2-DCA 1.30E+01J
20.6-22.6 ACETONE 2.00E+03B-RV
22.6-24 1,2-DCA 1.60E+01J
22.6-24 ACETONE 2.40E+03B-RV
3387/BH5687
17-18.9 METHYLENE CHLORIDE 5.00E+00J
19.5-22 ACETONE 1.20E+02B-RV
19.5-22 METHYLENE CHLORIDE 4.80E+01
22-24.3 ACETONE 1.10E+02B-RV
22-24.3 METHYLENE CHLORIDE 2.60E+01
CENTRAL AVE.
08091
19.3-19.5 2-BUTANONE 6.70E+01V
10691
23.8-24 TOTAL XYLENES 2.00E+00JA
05291
05191
05091
BH5087
12-12.9 ACETONE 1.00E+03B-RV
14.5-17 1,2-DCA 1.10E+02
14.5-17 ACETONE 1.00E+03B-RV
17-19.5 1,2-DCA 9.80E+01
17-19.5 ACETONE 5.10E+02B-RV
10891
BH5587
2-3.3 1,2-DCA 1.40E+01J
2-3.3 ACETONE 8.10E+02B-RV
2-3.3 TOTAL XYLENES 5.00E+00J
9.5-10.9 1,2-DCA 5.00E+00J
9.5-10.9 ACETONE 5.40E+02B-RV
12-14 1,2-DCA 6.00E+00J
12-14 ACETONE 1.20E+03B-RV
14.5-23.5 1,2-DCA 1.80E+01J
14.5-23.5 ACETONE 8.50E+02B-RV
27-29.2 1,2-DCA 1.90E+01J
27-29.2 ACETONE 1.10E+03B-RV
29.5-32 1,2-DCA 1.00E+02
29.5-32 ACETONE 1.20E+03B-RV
32-34.1 1,2-DCA 7.80E+01
32-34.1 1,2-DCA 6.60E+01
32-34.1 ACETONE 3.80E+02B-RV
32-34.1 ACETONE 6.20E+02B-RV
34.5-36.6 1,2-DCA 5.60E+01
34.5-36.6 ACETONE 3.00E+02B-RV
10791
23.6-23.8 METHYLENE CHLORIDE 4.00E+00JA
26.4-26.6 METHYLENE CHLORIDE 3.00E+00JA
31.8-32 METHYLENE CHLORIDE 4.00E+00JA
35.8-36 METHYLENE CHLORIDE 4.00E+00JA
39.8-40 METHYLENE CHLORIDE 3.00E+00JA
43.8-44 METHYLENE CHLORIDE 2.00E+00JA
10991
47.8-48 METHYLENE CHLORIDE 2.00E+00JA
B218189
12-13.8 ETHYLBENZENE 4.00E+00JA
35-36 ACETONE 1.70E+01A
11191A
08391
29.7-29.9 ACETONE 1.80E+01V
29.7-29.9 PCE 5.00E+00JA
32.9-33.1 ACETONE 1.70E+01V
37.7-37.9 ACETONE 2.90E+01V
37.7-37.9 PCE 2.00E+00JA
41.7-41.9 ACETONE 8.40E+01JA
04891
07991
2.8-3 1,2-DCE 9.00E+01JA
2.8-3 4-METHYL-2-PENTANONE 1.10E+01JA
2.8-3 ACETONE 2.40E+01JA
2.8-3 CHCL3 4.00E+00JJA
2.8-3 ETHYLBENZENE 2.60E+01JA
2.8-3 METHYLENE CHLORIDE 1.00E+01JA
2.8-3 TCE 6.00E+00JA
2.8-3 TOTAL XYLENES 2.30E+02JA
18.7-18.9 ACETONE 6.00E+00JA
22.3-22.5 ACETONE 1.00E+01JA
27.7-27.9 ACETONE 2.50E+01JA
27.7-27.9 METHYLENE CHLORIDE 1.70E+01V
30.7-30.9 METHYLENE CHLORIDE 5.00E+00JA
111.2
111.3
111.4
111.5
111.6
12891
08191
35-35.2 1,1,1-TCA 2.00E+00JA
216.3
T-12
04291
B218988
B215389
2-4 2-BUTANONE 1.10E+01A
6-7.5 1,1,1-TCA 3.00E+00JA
6-7.5 2-BUTANONE 9.00E+00JA
6-7.5 METHYLENE CHLORIDE 5.00E+00A
10-11 1,1,1-TCA 3.00E+00JA
10-11 2-BUTANONE 1.10E+01A
10-11 METHYLENE CHLORIDE 4.00E+00JA
14-15.8 1,1,1-TCA 3.00E+00JA
14-15.8 2-BUTANONE 1.00E+01JA
14-15.8 METHYLENE CHLORIDE 5.00E+00V
22-23 1,1,1-TCA 3.00E+00JA
22-23 2-BUTANONE 1.70E+01A
22-23 ACETONE 9.60E+01JA
22-23 METHYLENE CHLORIDE 8.00E+00V
26-28 2-BUTANONE 1.30E+01A
26-28 METHYLENE CHLORIDE 8.00E+00V
BH4987
6-7.3 1,2-DCA 2.30E+01J
6-7.3 ACETONE 3.00E+02B-RV
8-15.54 ACETONE 7.10E+02B-RV
20-22 1,2-DCA 1.50E+01J
22-24 1,2-DCA 1.50E+01J
24.14-25.64 1,2-DCA 3.40E+01
24.14-25.64 ACETONE 1.20E+02B-RV
B318889
04491
04691
43.9-44.1 ACETONE 7.00E+00JA
04591
10591
6-6.2 TOTAL XYLENES 2.00E+00JA
10.6-10.8 ACETONE 1.40E+01JA
10.6-10.8 ETHYLBENZENE 4.00E+00JA
10.6-10.8 TOTAL XYLENES 1.40E+01V
15.8-16 PCE 2.00E+00JA
15.8-16 TOTAL XYLENES 5.00E+00JA
17.6-17.8 TOTAL XYLENES 3.00E+00JA
17.8-18 ACETONE 1.20E+01JA
17.8-18 TOTAL XYLENES 2.00E+00JA
BH5487
2-4 1,2-DCA 1.20E+02
2-4 ACETONE 3.00E+02B-RV
2-4 CHCL3 5.00E+00J
2-4 TOTAL XYLENES 1.30E+01J
6-7.5 1,2-DCA 8.00E+00J
6-7.5 ACETONE 2.70E+02B-RV
8-9.65 1,2-DCA 1.10E+01J
8-9.65 ACETONE 2.00E+02B-RV
10-11.5 1,2-DCA 1.40E+01J
10-11.5 ACETONE 1.50E+02B-RV
12.2-14.2 1,2-DCA 5.00E+00J
12.2-14.2 ACETONE 2.90E+02B-RV
14.2-22.8 1,2-DCA 4.60E+01
14.2-22.8 ACETONE 1.60E+03B-RV
23.5-32.8 1,2-DCA 2.20E+01J
23.5-32.8 ACETONE 1.90E+02B-RV
42.5-44 1,2-DCA 1.10E+01J
42.5-44 1,2-DCA 2.00E+01J
42.5-44 ACETONE 2.80E+02B-RV
42.5-44 ACETONE 4.60E+02B-RV
BH4887
6-7.14 1,2-DCA 8.00E+00J
6-7.14 ACETONE 1.00E+02B-RV
6-7.14 ACETONE 2.20E+02B-RV
13.2-15.11 ACETONE 1.20E+03B-RV
15.2-16.7 ACETONE 4.80E+02B-RV
B218689
4-5.3 ACETONE 8.00E+00JA
8-9.5 ACETONE 3.00E+00JA
12-13.3 ACETONE 8.00E+00JA
16-18 ACETONE 7.00E+00JA
04191
18.7-18.9 ACETONE 2.10E+01JA
18.7-18.9 METHYLENE CHLORIDE 2.00E+00JA
08291
2.7-2.9 ACETONE 2.80E+02DV
2.7-2.9 TOTAL XYLENES 7.00E+00DJA
7.5-7.7 1,1,2,2-PCA 5.00E+00V
7.5-7.7 ACETONE 2.10E+01JA
19.8-20 ACETONE 3.20E+01JA
08491
2.5-2.7 ACETONE 3.10E+01V
6.9-7.1 ACETONE 2.00E+01JA
18.7-18.9 1,1,2,2-PCA 6.00E+00V
18.7-18.9 ACETONE 5.00E+00JA
BH5187
0-9 ACETONE 1.70E+03B-RV
12-14.4 1,2-DCA 7.00E+00J
12-14.4 ACETONE 3.00E+02B-RV
14.5-17 1,2-DCA 2.40E+01J
14.5-17 ACETONE 4.20E+02B-RV
17-19.5 1,2-DCA 8.00E+00J
BH5287
0-9.5 1,2-DCA 7.00E+00J
22-24 1,2-DCA 1.30E+01J
24-25 1,2-DCA 2.60E+01
08591
35.8-36 PCE 5.00E+00JA
B319789
0-2 ACETONE 1.00E+01JA
0-2 ETHYLBENZENE 3.00E+00JA
0-2 METHYLENE CHLORIDE 9.00E+00V
0-2 PCE 2.00E+00JA
0-2 TOTAL XYLENES 4.00E+00A
4-5 ACETONE 3.20E+01A
4-5 METHYLENE CHLORIDE 4.00E+00JA
8-9.3 2-BUTANONE 9.00E+00JA
8-9.3 ACETONE 2.30E+01A
8-9.3 METHYLENE CHLORIDE 4.00E+00JA
12-14 ACETONE 1.50E+01A
12-14 METHYLENE CHLORIDE 6.00E+00V
16-17.5 ACETONE 1.60E+01A
16-17.5 METHYLENE CHLORIDE 2.00E+00JA
20-22 2-BUTANONE 8.00E+00JA
20-22 ACETONE 2.70E+01A
20-22 METHYLENE CHLORIDE 1.00E+01V
24-26 ACETONE 2.60E+01A
24-26 METHYLENE CHLORIDE 1.00E+01V
28-30 ACETONE 2.20E+01A
28-30 METHYLENE CHLORIDE 7.00E+00V
32-34 2-BUTANONE 7.00E+00JA
32-34 ACETONE 1.60E+01A
32-34 METHYLENE CHLORIDE 8.00E+00V
5920
5900
5880
5860
5840
DRAFT
NOTE:
ALL LOCATIONS SHOWN ON THIS MAP WERE SAMPLED. RESULTS ARE SHOWN ONLY WHERE CHEMICALS WERE DETECTED.
EXPLANATION
09491 SOURCE BOREHOLE LOCATION
01191A ABANDONED M.W. LOCATION
00291 BEDROCK MONITORING WELL LOCATION
00891 ALLUVIAL MONITORING WELL LOCATION
06691 SOURCE BOREHOLE/MONITORING WELL LOCATION OPEN OR FILLED DEPENDING ON ALLUVIAL OR BEDROCK SCREENED INTERVAL
20791 OBSERVATION OR PUMPING WELL LOCATION
111.4 INDIVIDUAL HAZARDOUS SUBSTANCE SITE LOCATION
EXPLANATION
08191 LOCATION
2-8
SAMPLE INTERVAL (ft)
ANALYTE
ANALYTE CONCENTRATION (ug/kg) AND LAB AND VALIDATION QUALIFIERS
NOTE:
ALL ANALYTE CONCENTRATIONS ARE REPORTED IN ug/kg (parts per billion).
U.S. DEPARTMENT OF ENERGY
Rocky Flats Plant, Golden, Colorado
OPERABLE UNIT NO.2
TECHNICAL MEMORANDUM NO. 9
VOLATILE ORGANIC COMPOUNDS
IN SUBSURFACE SOILS
S.E. TRENCHES AREA
FIGURE 4-5d
JULY 1994
0U2TM913 1=200



DRAFT

EXPLANATION

08691 ← LOCATION

0-11

SAMPLE INTERVAL (ft) | ANALYTE | ANALYTE ACTIVITY (pCi/g) AND LAB AND VALIDATION QUALIFIERS

NOTE:
ALL ANALYTE ACTIVITES ARE REPORTED IN pCi/g. TRITIUM IS REPORTED IN pCi/l.

EXPLANATION

- 09491 ⬡ SOURCE BOREHOLE LOCATION
- 01191A ⬡ ABANDONED M.W. LOCATION
- 00291 ● BEDROCK MONITORING WELL LOCATION
- 00891 ○ ALLUVIAL MONITORING WELL LOCATION
- 06691 ◉ SOURCE BOREHOLE/MONITORING WELL LOCATION OPEN OR FILLED DEPENDING ON ALLUVIAL OR BEDROCK SCREENED INTERVAL
- 111.4 INDIVIDUAL HAZARDOUS SUBSTANCE SITE LOCATION

NOTE:
ALL LOCATIONS SHOWN ON THIS MAP WERE SAMPLED. RESULTS ARE SHOWN ONLY WHERE THE CHEMICALS WERE DETECTED.

U.S. DEPARTMENT OF ENERGY
Rocky Flats Plant, Golden, Colorado

OPERABLE UNIT NO.2
TECHNICAL MEMORANDUM NO. 9

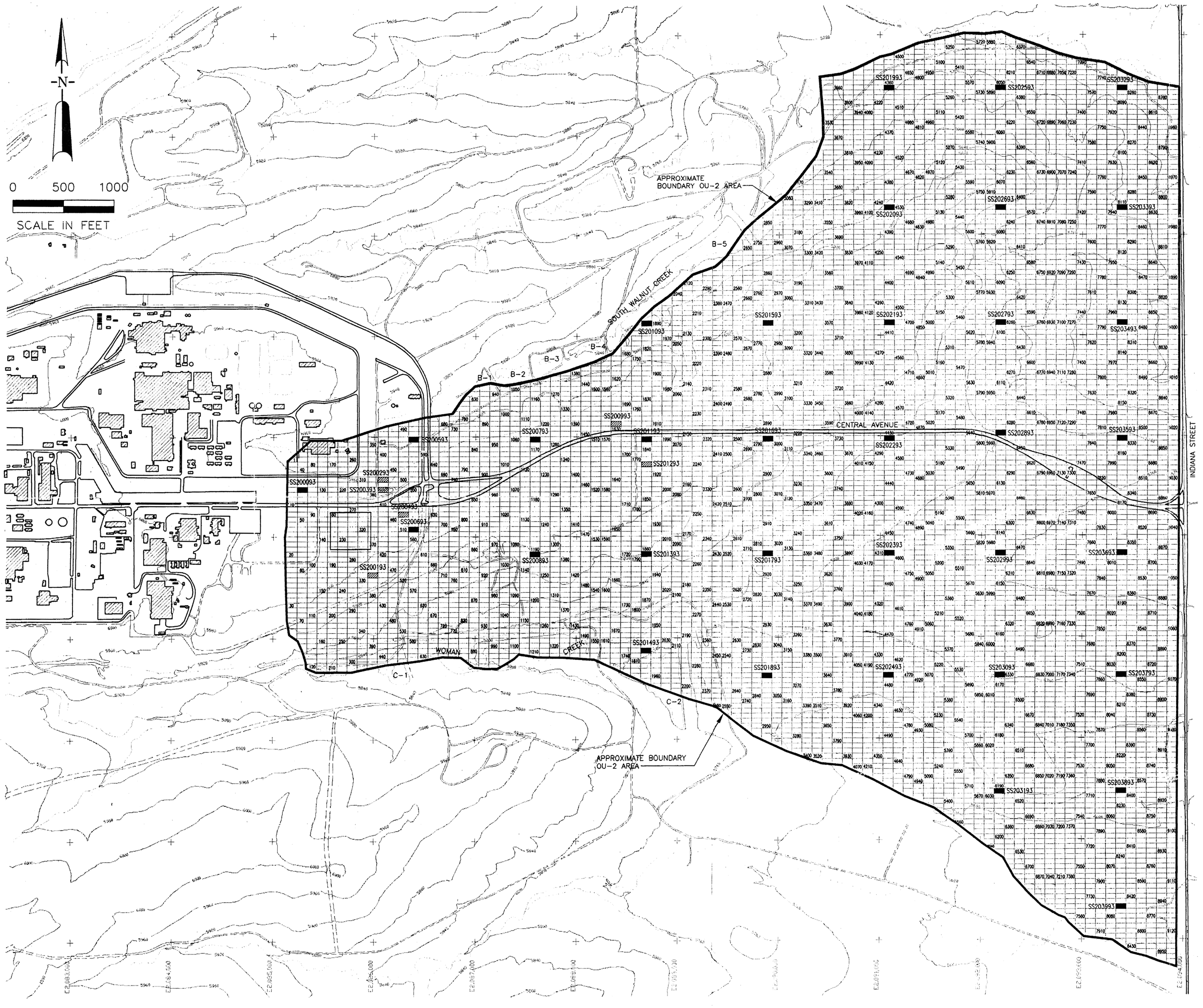
VOLATILE ORGANIC COMPOUNDS
IN SUBSURFACE SOILS
EAST OF IHSSs AREAS

FIGURE 4-5e JULY 1994

OU2TM914 1=1000

NOTICE

All drawings located at the end of the document.



EXPLANATION

- 5610 — 50'x100' PLOT
- SS200193 — BIASED SURFACE SOIL SAMPLING PLOT LOCATION
- SS200093 — GRID-BASED SURFACE SOIL SAMPLING PLOT LOCATION

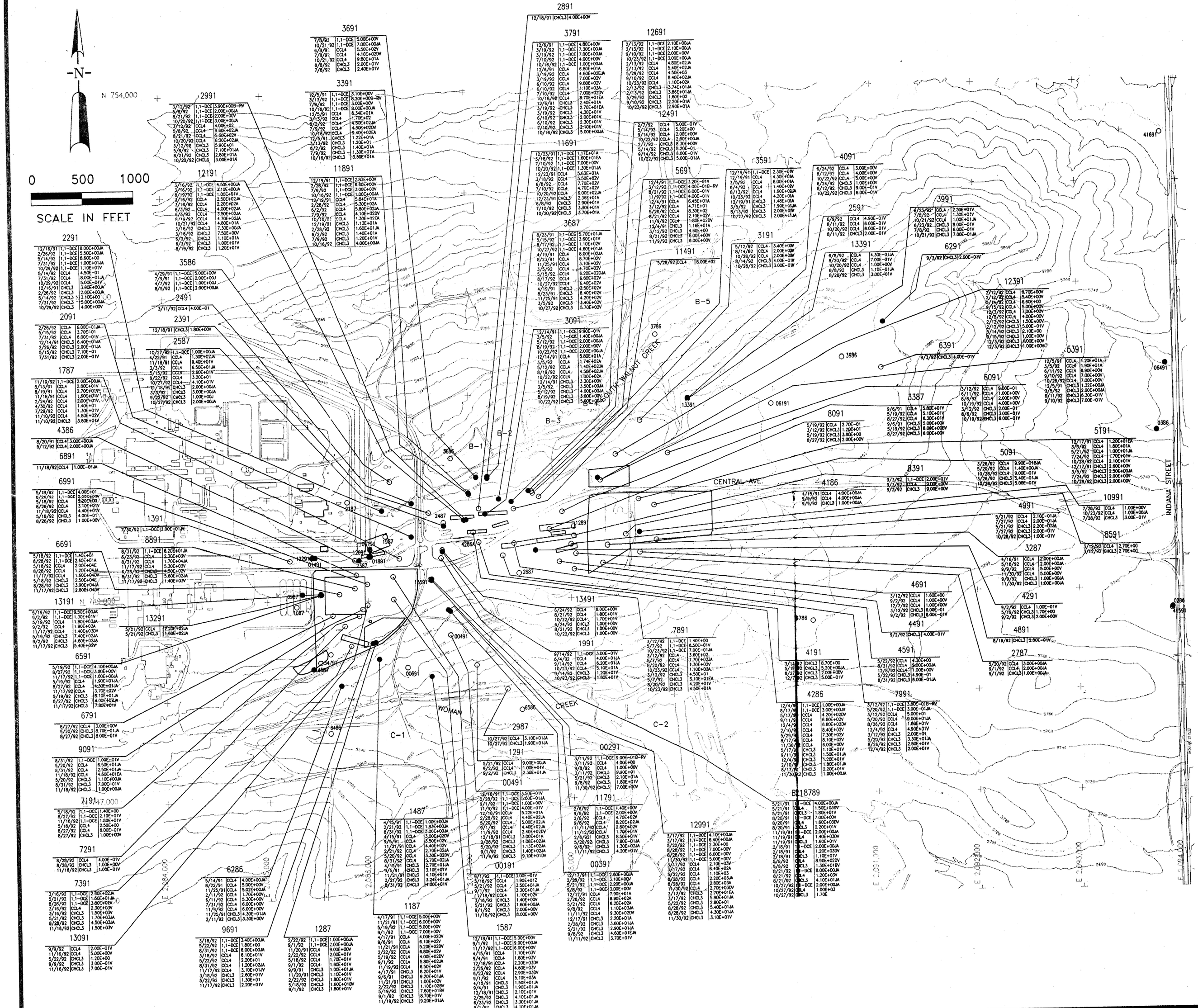
U.S. DEPARTMENT OF ENERGY
Rocky Flats Plant, Golden, Colorado

OPERABLE UNIT NO. 2
TECHNICAL MEMORANDUM NO. 9

1993 SURFACE SOIL SAMPLING
PLOT LOCATIONS

FIGURE 3-2 JULY 1994

OU2TM905 1=500



EXPLANATION

- 3788 ○ 1986–1990 ALLUVIAL MONITORING WELL
- 3087 ● 1986–1990 BEDROCK MONITORING WELL
- 4286A ○ ABANDONED MONITORING WELL
- 174A ▲ 1968–1974 MONITORING WELL
- INDIVIDUAL HAZARDOUS SUBSTANCE SITE LOCATION

76292 ← LOCATION

2/26/92 ← SAMPLE DATE | ANALYTE | ANALYTE CONCENTRATION (ug/kg), LAB QUALIFIERS, AND VALIDATION CODES

NOTE:
ALL ANALYTE CONCENTRATIONS ARE REPORTED IN mg/kg (parts per million).

NOTE:
ALL LOCATIONS SHOWN ON THIS MAP WERE SAMPLED. RESULTS ARE SHOWN ONLY WHERE THE CHEMICALS WERE DETECTED ABOVE MEAN PLUS 2 STANDARD DEVIATION.

U.S. DEPARTMENT OF ENERGY
Rocky Flats Plant, Golden, Colorado

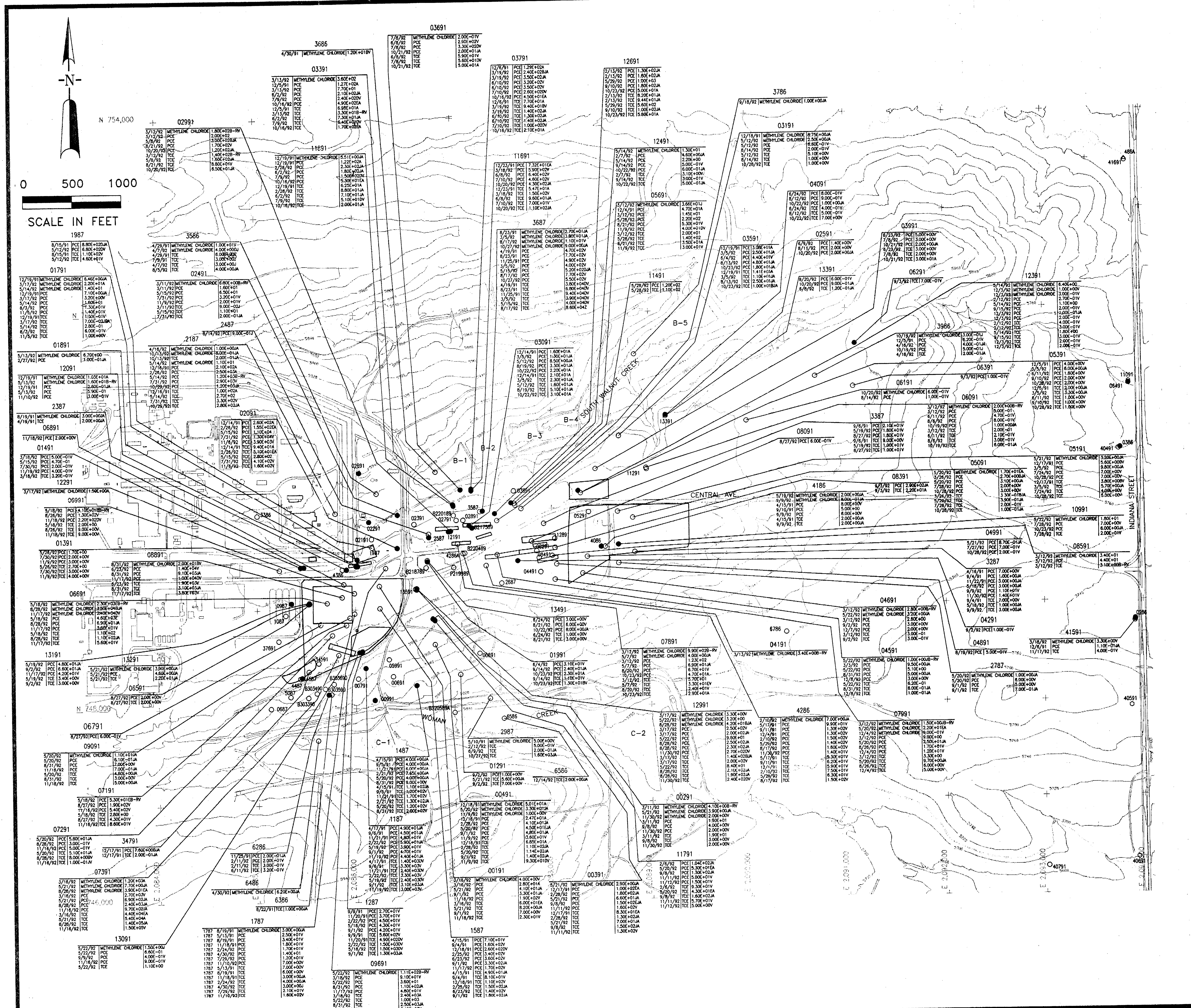
OPERABLE UNIT NO.2
TECHNICAL MEMORANDUM NO. 9

VOLATILE ORGANIC COMPOUNDS IN UHSU GROUNDWATER (1,1-DCE – CHCl3)

(SECOND QUARTER 1991 – THIRD QUARTER 1993)

FIGURE 5-3a JULY 1994

OU2TM918 1=500



EXPLANATION

- 3786 ○ 1986–1990 ALLUVIAL MONITORING WELL
- 3087 ● 1986–1990 BEDROCK MONITORING WELL
- 4286A ○ ABANDONED MONITORING WELL
- 174A ▲ 1968–1974 MONITORING WELL
- INDIVIDUAL HAZARDOUS SUBSTANCE SITE LOCATION

76292 ← LOCATION
2/26/92
SAMPLE DATE — ANALYTE — ANALYTE CONCENTRATION (mg/kg), LAB QUALIFIERS, AND VALIDATION CODES

NOTE:
ALL ANALYTE CONCENTRATIONS ARE REPORTED IN mg/kg (parts per million).

NOTE:
ALL LOCATIONS SHOWN ON THIS MAP WERE SAMPLED. RESULTS ARE SHOWN ONLY WHERE THE CHEMICALS WERE DETECTED ABOVE MEAN PLUS 2 STANDARD DEVIATION.

U.S. DEPARTMENT OF ENERGY
Rocky Flats Plant, Golden, Colorado

OPERABLE UNIT NO.2
TECHNICAL MEMORANDUM NO. 9

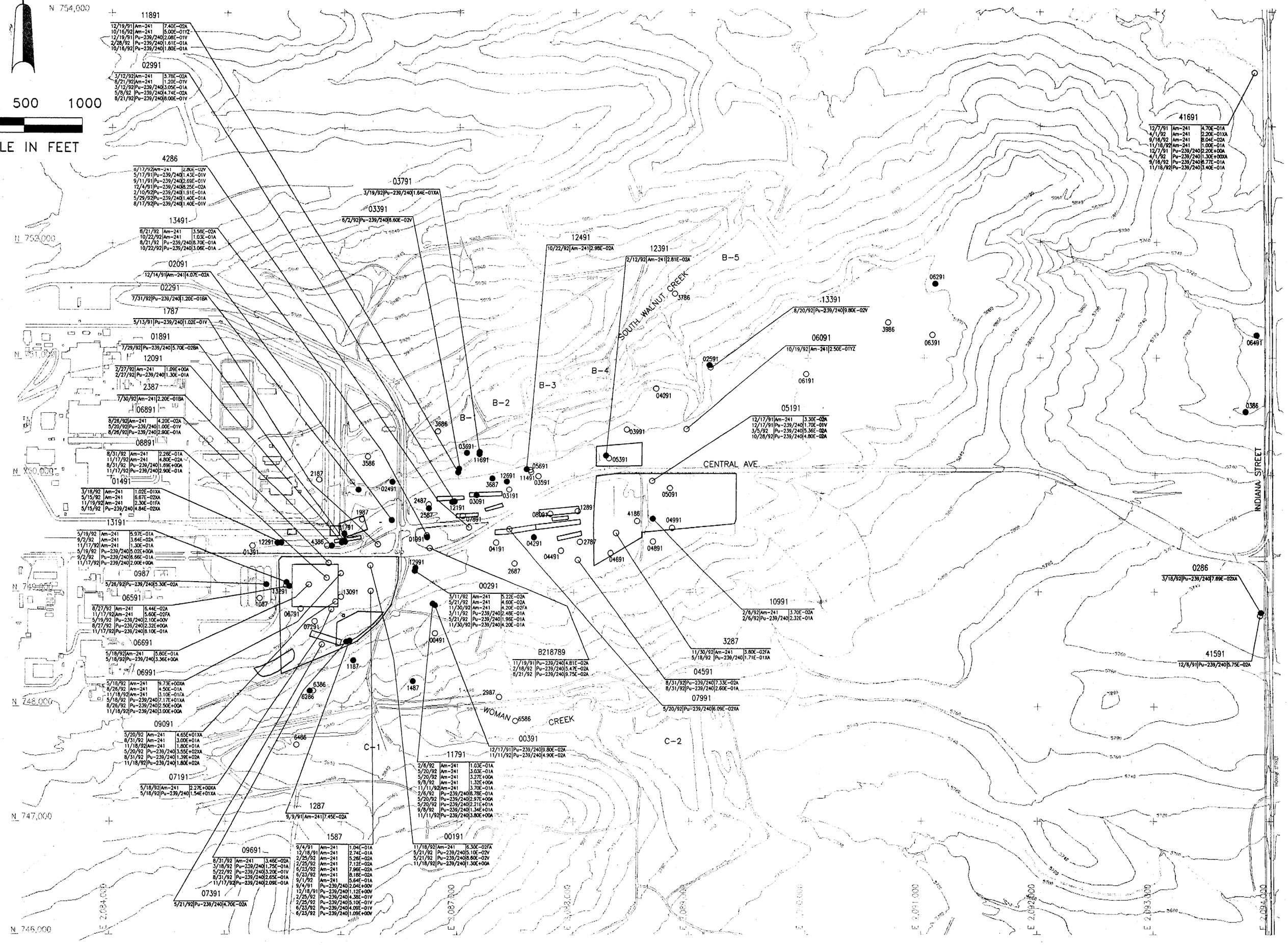
VOLATILE ORGANIC COMPOUNDS IN UHSU GROUNDWATER (CH2Cl2 – TCE)

(SECOND QUARTER 1991 – THIRD QUARTER 1993)

FIGURE 5–3b

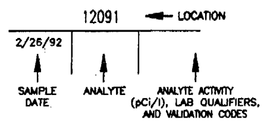
JULY 1994

OU2TM917 1=500



EXPLANATION

- 3786 ○ ALLUVIAL MONITORING WELL
- 3087 ● BEDROCK MONITORING WELL
- 4286A ○ ABANDONED MONITORING WELL
- INDIVIDUAL HAZARDOUS SUBSTANCE SITE LOCATION



NOTE:
ALL ANALYTE ACTIVITES ARE REPORTED IN pCi/l.

NOTE:
ALL LOCATIONS SHOWN ON THIS MAP WERE SAMPLED. RESULTS ARE SHOWN ONLY WHERE THE CHEMICALS WERE DETECTED ABOVE THE BACKGROUND MEAN PLUS 2 STANDARD DEVIATIONS.

U.S. DEPARTMENT OF ENERGY
Rocky Flats Plant, Golden, Colorado

OPERABLE UNIT NO.2
TECHNICAL MEMORANDUM NO. 9

UNFILTERED RADIONUCLIDES IN UHSU GROUNDWATER (SECOND QUARTER 1991 – FOURTH QUARTER 1992)

FIGURE 5-4 JULY 1994

OU2TM916 1=500

EXPLANATION

- 3786 ○ ALLUVIAL MONITORING WELL
- 3087 ● BEDROCK MONITORING WELL
- 4286A ○ ABANDONED MONITORING WELL
- INDIVIDUAL HAZARDOUS SUBSTANCE SITE LOCATION

76292 ← LOCATION
2/26/92
SAMPLE DATE | ANALYTE | ANALYTE CONCENTRATION (pCi/l, LAB QUALIFIERS, AND VALIDATION CODES)

NOTE:
ALL ANALYTE CONCENTRATIONS ARE REPORTED IN mg/l (parts per million). ANALYTE ABBREVIATIONS AND LAB AND VALIDATION QUALIFIERS ARE PRESENTED ON FIGURE 4.2-1.

NOTE:
ALL LOCATIONS SHOWN ON THIS MAP WERE SAMPLED.

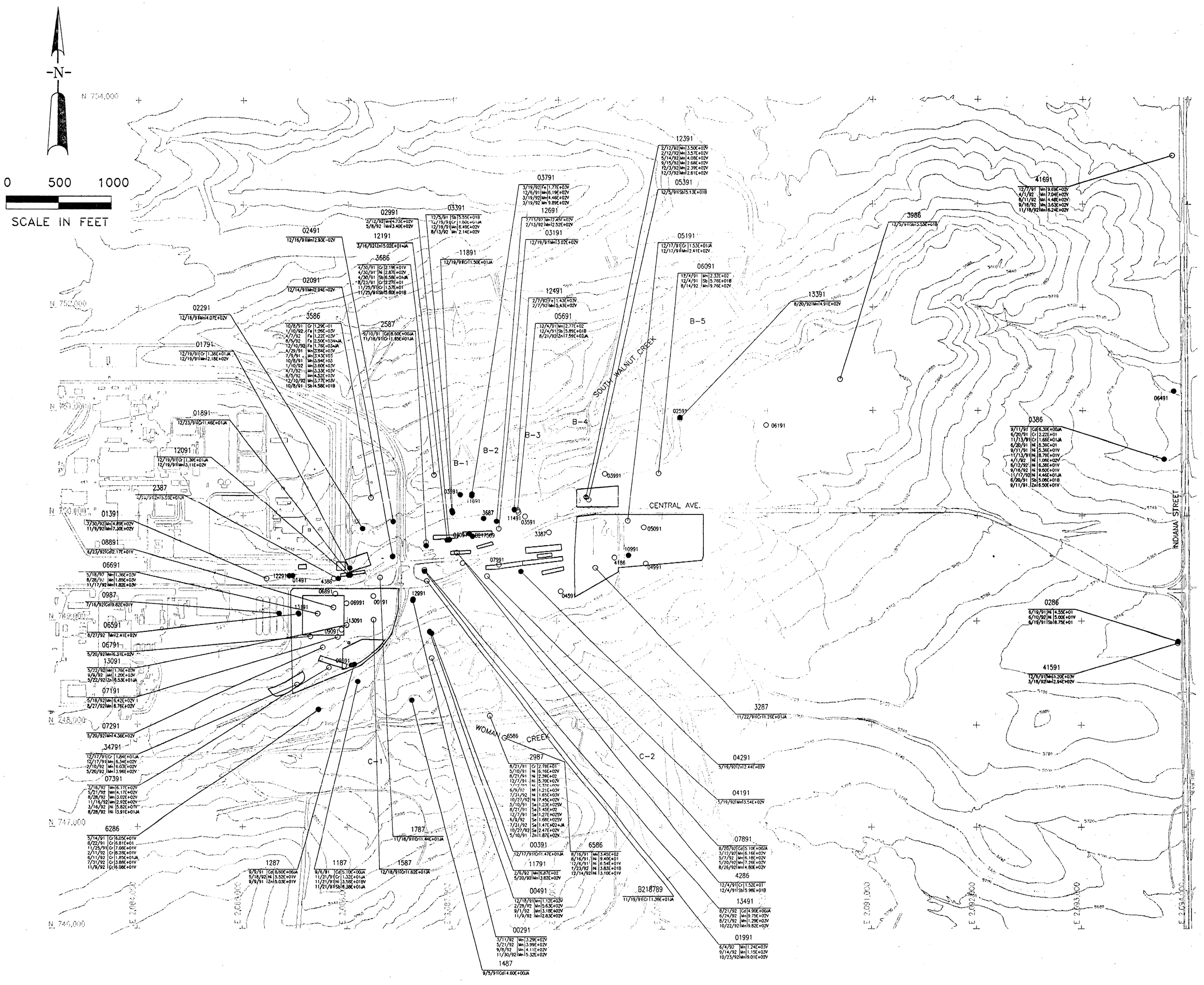
U.S. DEPARTMENT OF ENERGY
Rocky Flats Plant, Golden, Colorado

OPERABLE UNIT NO.2
TECHNICAL MEMORANDUM NO.9

NITRATES IN USHU GROUNDWATER: CONCENTRATIONS ABOVE 10 mg/l MCL

FIGURE 5-5 JULY 1994

OU2TM941 1=500



EXPLANATION

- 3786 ○ ALLUVIAL MONITORING WELL
- 3087 ● BEDROCK MONITORING WELL
- 4286A ○ ABANDONED MONITORING WELL
- INDIVIDUAL HAZARDOUS SUBSTANCE SITE LOCATION

76292 ← LOCATION
2/26/92 ← SAMPLE DATE
ANALYTE
ANALYTE CONCENTRATION (ug/l), LAB QUALIFIERS, AND VALIDATION CODES

NOTE:
ALL ANALYTE CONCENTRATIONS ARE REPORTED IN ug/l (parts per billion). ANALYTE ABBREVIATIONS AND LAB AND VALIDATION QUALIFIERS ARE PRESENTED ON FIGURE ___.

DRAFT
For comments and discussion only.

NOTE:
ALL LOCATIONS SHOWN ON THIS MAP WERE SAMPLED. RESULTS ARE SHOWN ONLY WHERE THE CHEMICALS WERE DETECTED ABOVE THE BACKGROUND MEAN PLUS 2 STANDARD DEVIATIONS.

U.S. DEPARTMENT OF ENERGY
Rocky Flats Plant, Golden, Colorado

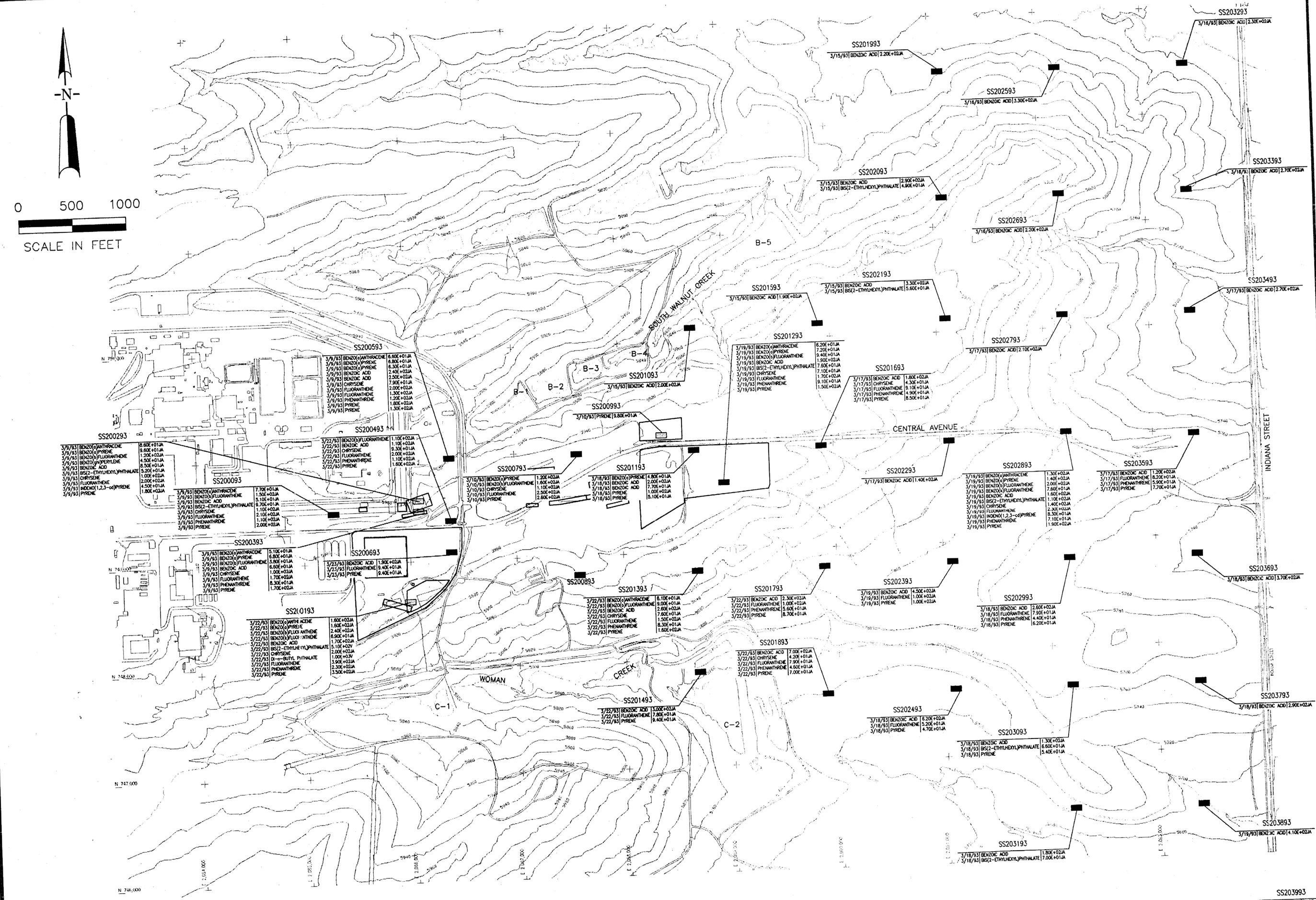
OPERABLE UNIT NO.2
TECHNICAL MEMORANDUM NO. 9

PCOC FILTERED METALS

UHSU GROUNDWATER (SECOND QUARTER 1991 - FOURTH QUARTER 1992)

FIGURE C-1 JULY 1994

OU2RI523 1=500



EXPLANATION

SS200193 — BIASED SURFACE SOIL SAMPLING PLOT LOCATION 50'x100' PLOT (1993 RFP SAMPLING)

SS200093 — GRID-BASED SURFACE SOIL SAMPLING PLOT LOCATION 50'x100' PLOT (1993 RFP SAMPLING)

120 ← LOCATION

3/18/93 — SAMPLE DATE

ANALYTE — ANALYTE ACTIVITY (ug/kg), LAB QUALIFIERS, AND VALIDATION CODES

NOTE:
ALL ANALYTE ACTIVITIES ARE REPORTED IN ug/kg (parts per billion). ANALYTE ABBREVIATIONS AND LAB AND VALIDATION QUALIFIERS ARE PRESENTED ON FIGURE 4.2-1.

NOTE:
ALL LOCATIONS SHOWN ON THIS MAP WERE SAMPLED. RESULTS ARE SHOWN ONLY WHERE THE CHEMICALS WERE DETECTED.

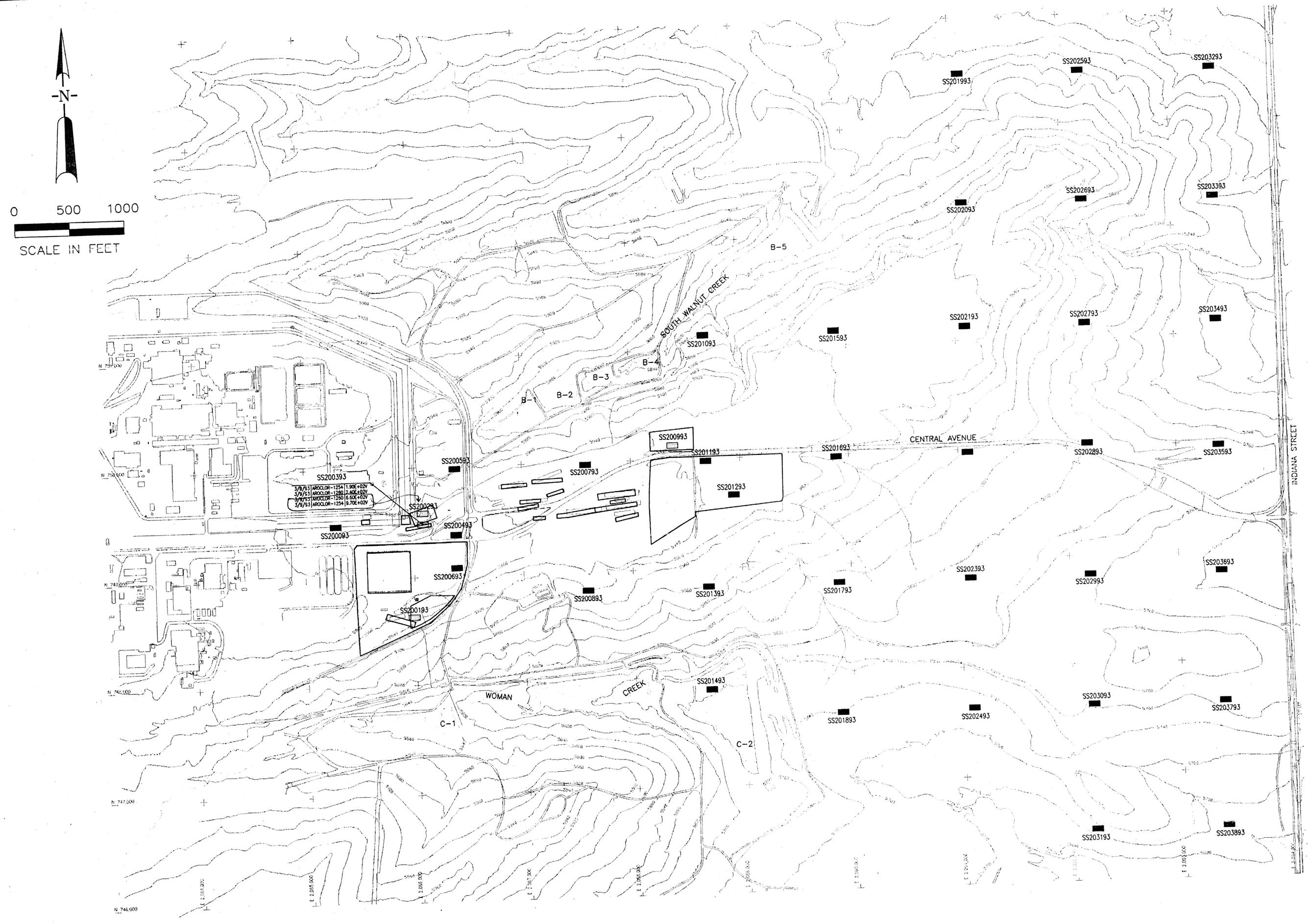
U.S. DEPARTMENT OF ENERGY
Rocky Flats Plant, Golden, Colorado

OPERABLE UNIT NO. 2
TECHNICAL MEMORANDUM NO. 9

SEMIVOLATILE ORGANIC COMPOUNDS DETECTED IN SURFACE SOILS (RFP METHOD)

FIGURE 3-3 JULY 1994

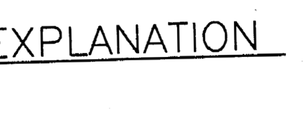
OU2TM904 1=500



EXPLANATION

SS200193 — BIASED SURFACE SOIL SAMPLING PLOT LOCATION 50'x100' PLOT (1993 RFP SAMPLING)

SS200093 — GRID-BASED SURFACE SOIL SAMPLING PLOT LOCATION 50'x100' PLOT (1993 RFP SAMPLING)



NOTE:
ALL ANALYTE ACTIVITIES ARE REPORTED IN ug/kg (parts per billion).

NOTE:
ALL LOCATIONS SHOWN ON THIS MAP WERE SAMPLED. RESULTS ARE SHOWN ONLY WHERE THE CHEMICALS WERE DETECTED.

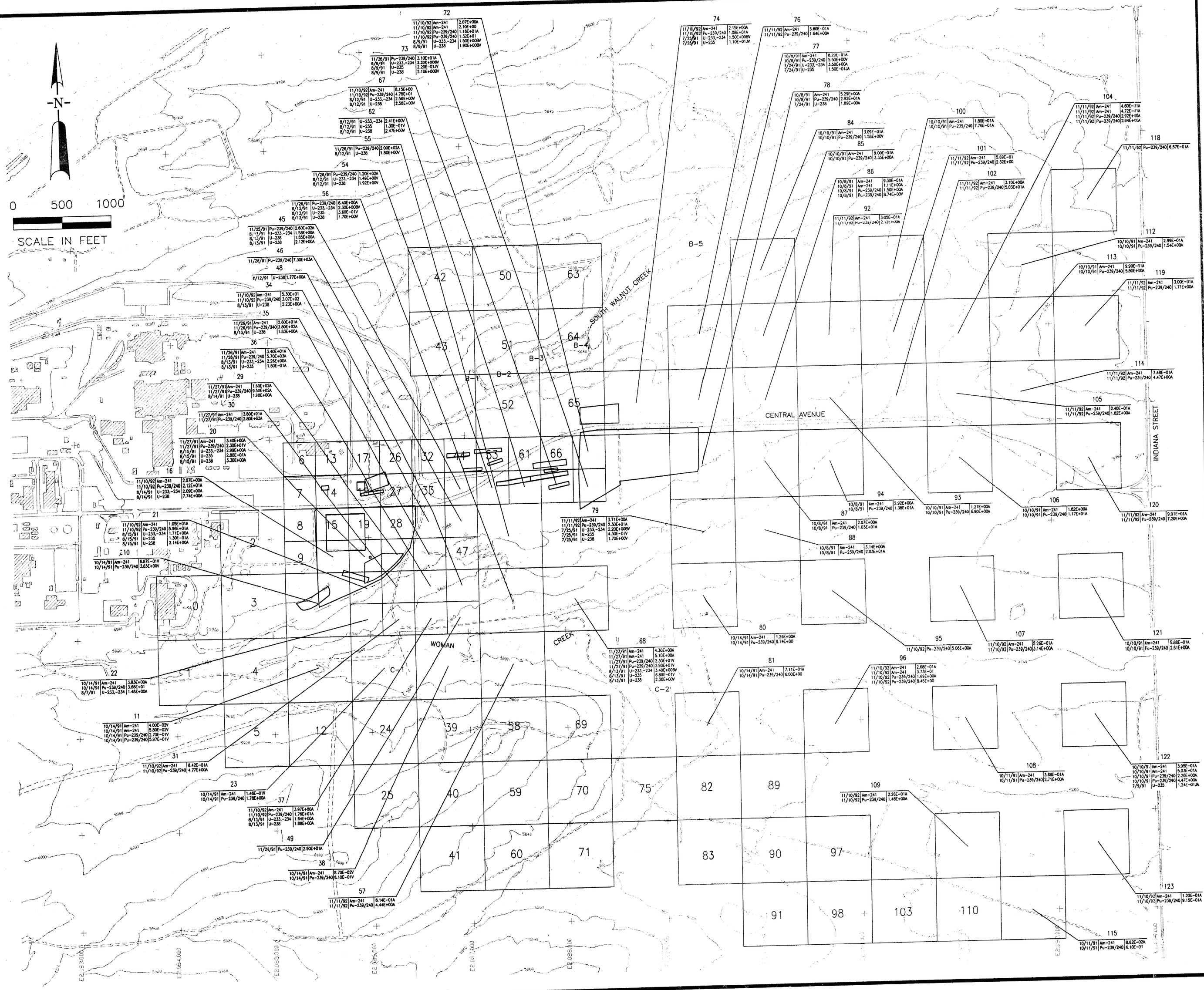
U.S. DEPARTMENT OF ENERGY
Rocky Flats Plant, Golden, Colorado

OPERABLE UNIT NO.2
TECHNICAL MEMORANDUM NO. 9

PCBs IN SURFACE SOILS

FIGURE 3-4 JULY 1994

OU2TM915 1=500



EXPLANATION

108 — 10 ACRE SURFACE SOIL SAMPLING PLOT LOCATIONS (1991 CDH AND RFP SAMPLING METHOD)

9 — 2.5 ACRE SURFACE SOIL SAMPLING PLOT LOCATIONS (1991 CDH AND RFP SAMPLING METHOD)

100 ← LOCATION

3/15/91 ← SAMPLE DATE; ANALYTE; ANALYTE ACTIVITY (pCi/g), LAB QUALIFIERS, AND VALIDATION CODES

NOTE:
ALL ANALYTE ACTIVITIES ARE REPORTED IN pCi/g.

NOTE:
ALL LOCATIONS SHOWN ON THIS MAP WERE SAMPLED. RESULTS ARE SHOWN ONLY WHERE THE CHEMICALS WERE DETECTED ABOVE THE BACKGROUND MEAN PLUS 2 STANDARD DEVIATIONS.

U.S. DEPARTMENT OF ENERGY
Rocky Flats Plant, Golden, Colorado

OPERABLE UNIT NO.2
TECHNICAL MEMORANDUM NO. 9

RADIONUCLIDES IN SURFACE SOIL

FIGURE 3-5 JULY 1994

OU2TM919 1=500

EXPLANATION

- BH1587 ○ 1987 BOREHOLE LOCATION
- B315789 ○ 1989–1990 BOREHOLE LOCATION
- 09491 ○ 1991–1992 BOREHOLE LOCATION
- 01091A ○ ABANDONED MONITORING WELL INSTALLATION ATTEMPT
- 21293P ○ 1993 PILOT BOREHOLE LOCATION
- INDIVIDUAL HAZARDOUS SUBSTANCE SITE LOCATION
- APPROXIMATE BOUNDARY OF OU-2 STUDY AREA

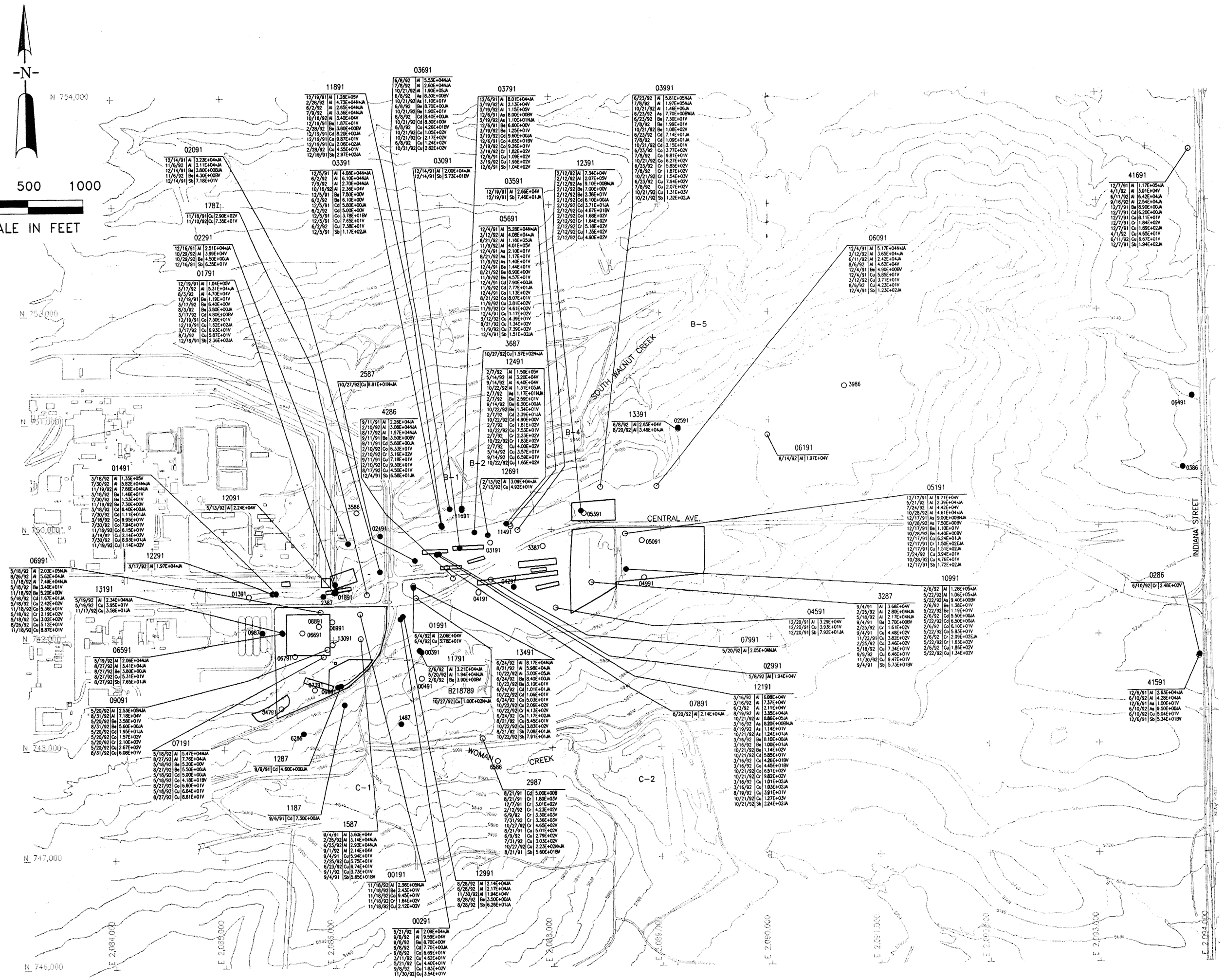
U.S. DEPARTMENT OF ENERGY
Rocky Flats Plant, Golden, Colorado

OPERABLE UNIT NO. 2
TECHNICAL MEMORANDUM NO. 9

OU-2 BOREHOLE LOCATIONS
(HISTORICAL, PHASE II, AND OTHER INVESTIGATIONS)

FIGURE 4-1 JULY 1994

OU2TM906 1=500



EXPLANATION

- 3786 ○ ALLUVIAL MONITORING WELL
- 3087 ● BEDROCK MONITORING WELL
- 4286A ○ ABANDONED MONITORING WELL
- INDIVIDUAL HAZARDOUS SUBSTANCE SITE LOCATION

00191 ← LOCATION
2/26/92 ← SAMPLE DATE
ANALYTE ← ANALYTE CONCENTRATION (ug/l), LAB QUALIFIERS, AND VALIDATION CODES

NOTE:
ALL ANALYTE CONCENTRATIONS ARE REPORTED IN ug/l (parts per billion).

NOTE:
ALL LOCATIONS SHOWN ON THIS MAP WERE SAMPLED. RESULTS ARE SHOWN ONLY WHERE THE CHEMICALS WERE DETECTED ABOVE THE BACKGROUND MEAN PLUS 2 STANDARD DEVIATIONS.

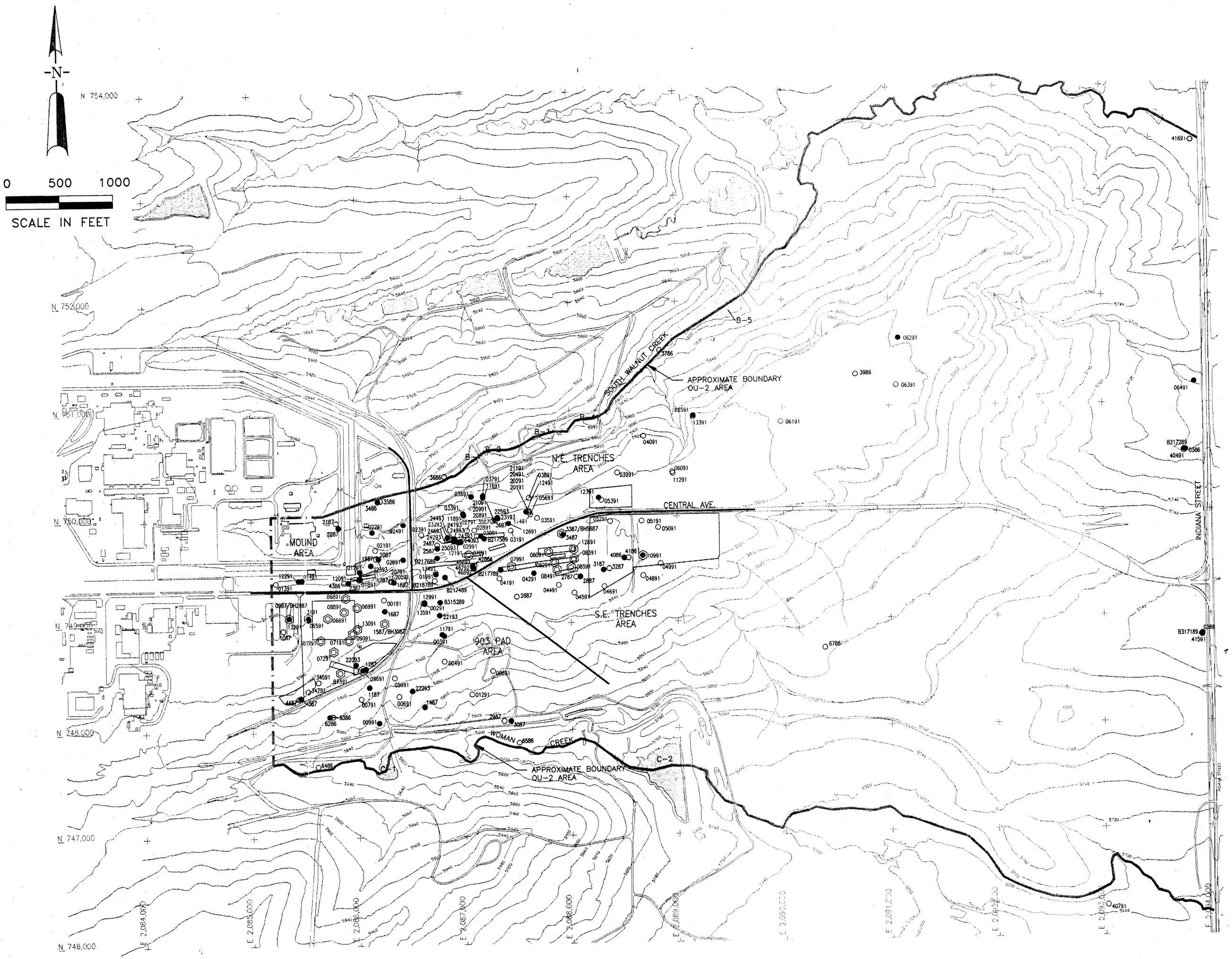
U.S. DEPARTMENT OF ENERGY
Rocky Flats Plant, Golden, Colorado

OPERABLE UNIT NO.2
TECHINICAL MEMORANDUM NO. 9

METALS ELIMINATED AS OU-WIDE COCs IN UHSU GROUNDWATER ALUMINUM, ANTIMONY AND BERYLLIUM (SECOND QUARTER 1991 - FOURTH QUARTER 1992) **UNFILTERED**

FIGURE 5-2b JULY 1994

0U2TM921 1=500



EXPLANATION

- 3786 ○ — 1986–1990 ALLUVIAL MONITORING WELL
- 3087 ● — 1986–1990 BEDROCK MONITORING WELL
- 00191 ○ — 1991–1992 ALLUVIAL MONITORING WELL
- 12691 ● — 1991–1992 BEDROCK MONITORING WELL
- 20591 / 20691 / 20791 — 1991 PUMPING TEST WELL CLUSTER
- 4286A ○ — ABANDONED MONITORING WELL
- 07891 ◎ — SOURCE BOREHOLE LOCATION AND MONITORING WELL LOCATION
- INDIVIDUAL HAZARDOUS SUBSTANCE SITE LOCATION
- APPROXIMATE BOUNDARY OF OU-2 STUDY AREA

U.S. DEPARTMENT OF ENERGY
Rocky Flats Plant, Golden, Colorado

OPERABLE UNIT NO. 2
TECHNICAL MEMORANDUM NO. 9

OU-2 MONITORING WELL LOCATIONS
(HISTORICAL, PHASE II, AND OTHER INVESTIGATIONS)

FIGURE 5-1 JULY 1994

OU2TM907 1=500

EXPLANATION

3786 ○ ALLUVIAL MONITORING WELL

3087 ● BEDROCK MONITORING WELL

4286A ○ ABANDONED MONITORING WELL

INDIVIDUAL HAZARDOUS SUBSTANCE SITE LOCATION

76292 ← LOCATION

2/26/92 — SAMPLE DATE; ANALYTE; ANALYTE CONCENTRATION (ug/l), LAB QUALIFIERS, AND VALIDATION CODES

NOTE:
ALL ANALYTE CONCENTRATIONS ARE REPORTED IN ug/l (parts per billion).

NOTE:
ALL LOCATIONS SHOWN ON THIS MAP WERE SAMPLED. RESULTS ARE SHOWN ONLY WHERE THE CHEMICALS WERE DETECTED ABOVE THE BACKGROUND MEAN PLUS 2 STANDARD DEVIATIONS.

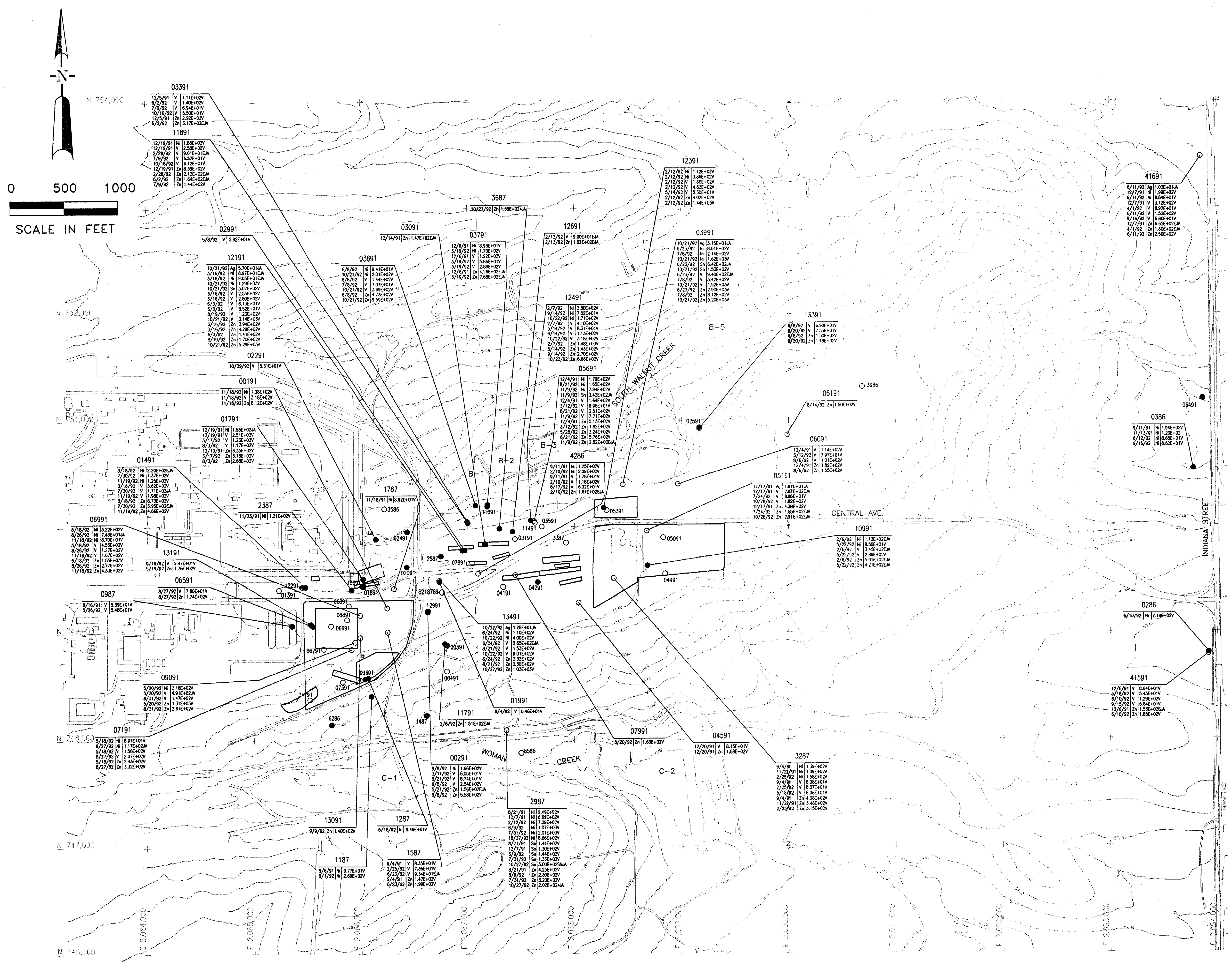
U.S. DEPARTMENT OF ENERGY
Rocky Flats Plant, Golden, Colorado

OPERABLE UNIT NO.2
TECHNICAL MEMORANDUM NO. 9

METALS ELIMINATED AS OU-WIDE COCs IN UHSU GROUNDWATER **UNFILTERED** MANGANESE (SECOND QUARTER 1991 - FOURTH QUARTER 1992)

FIGURE 5-2a JULY 1994

OU2TM920 1=500



EXPLANATION

- 3786 ○ ALLUVIAL MONITORING WELL
- 3087 ● BEDROCK MONITORING WELL
- 4286A ○ ABANDONED MONITORING WELL
- INDIVIDUAL HAZARDOUS SUBSTANCE SITE LOCATION

00191 ← LOCATION

2/26/92 — SAMPLE DATE; ANALYTE; ANALYTE CONCENTRATION (ug/l), LAB QUALIFIERS, AND VALIDATION CODES

NOTE:
ALL ANALYTE CONCENTRATIONS ARE REPORTED IN ug/l (parts per billion).

NOTE:
ALL LOCATIONS SHOWN ON THIS MAP WERE SAMPLED. RESULTS ARE SHOWN ONLY WHERE THE CHEMICALS WERE DETECTED ABOVE THE BACKGROUND MEAN PLUS 2 STANDARD DEVIATIONS.

U.S. DEPARTMENT OF ENERGY
Rocky Flats Plant, Golden, Colorado

OPERABLE UNIT NO.2
TECHNICAL MEMORANDUM NO. 9

METALS ELIMINATED AS OU-WIDE COCs IN UHSU GROUNDWATER **UNFILTERED** VANADIUM (SECOND QUARTER 1991 - FOURTH QUARTER 1992)

FIGURE 5-2c JULY 1994

OU2TM922 1=500